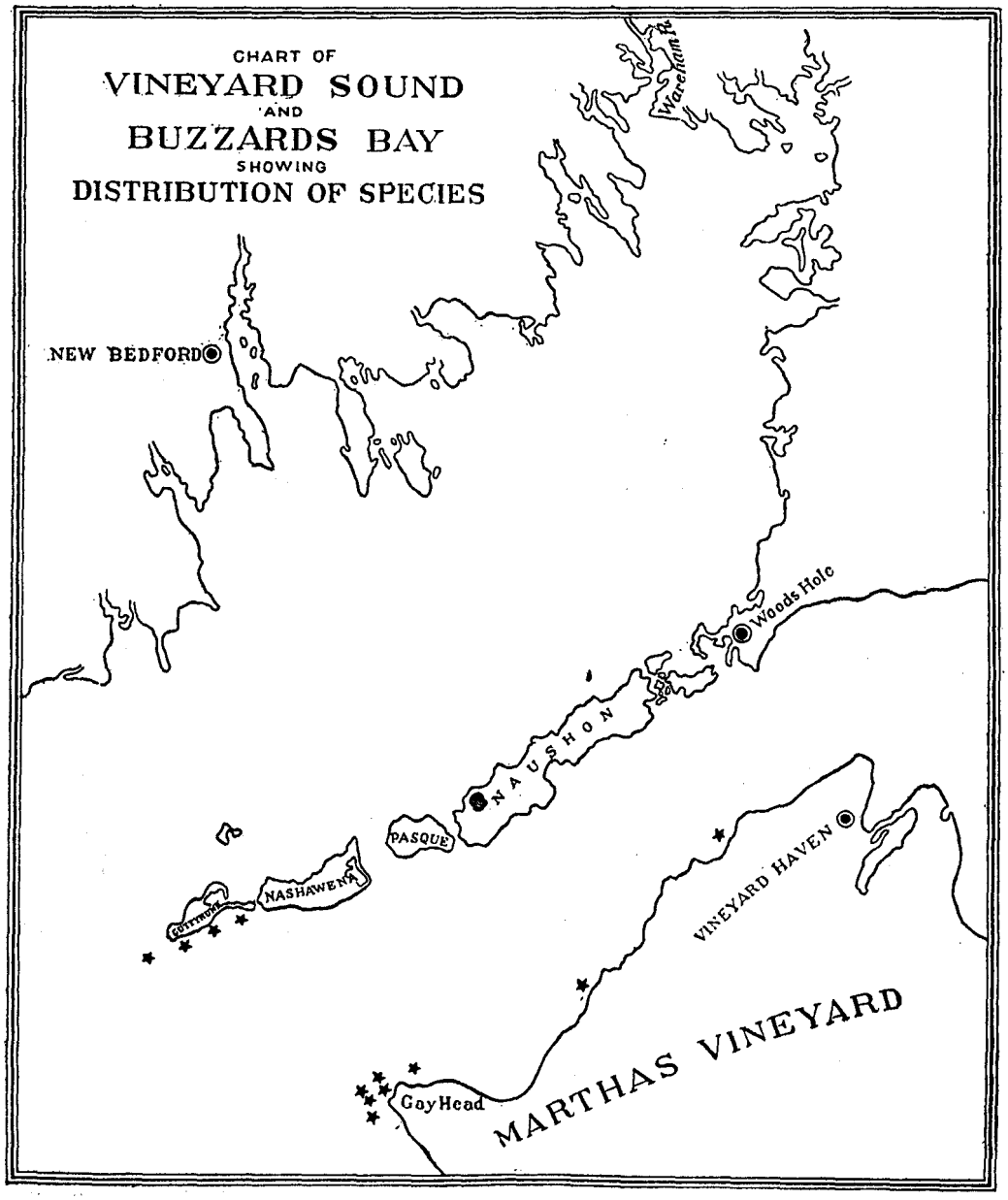

CHART 228.—Chætomorpha melagonium (Weber & Mohr) Kützing.

Present in the deeper and cooler waters off exposed points, such as Gay Head and Cuttyhunk.

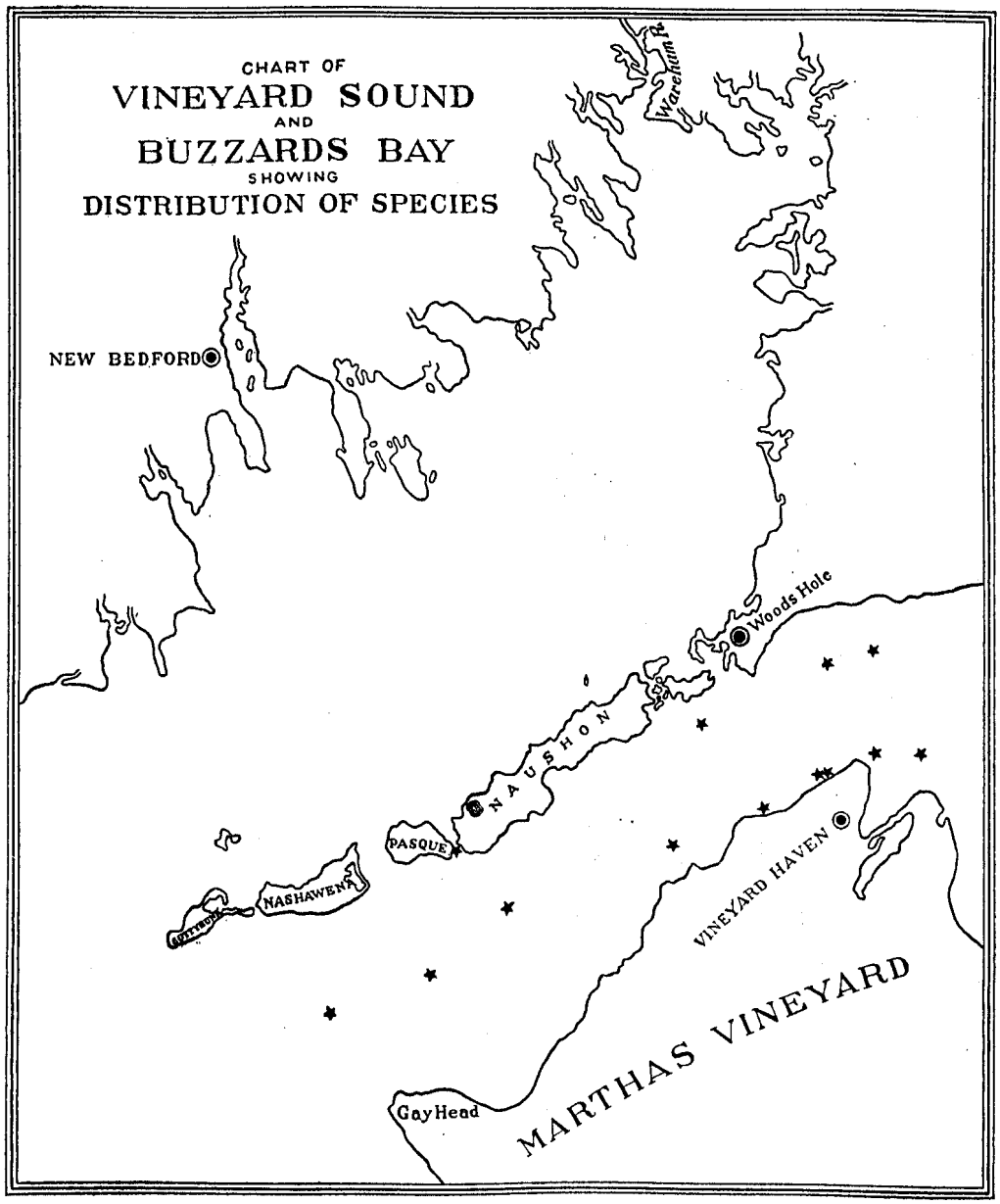

CHART 229.—Cladostephus verticillatus (Lightfoot) Agardh.

A scattered distribution throughout Vineyard Sound in fairly deep water.

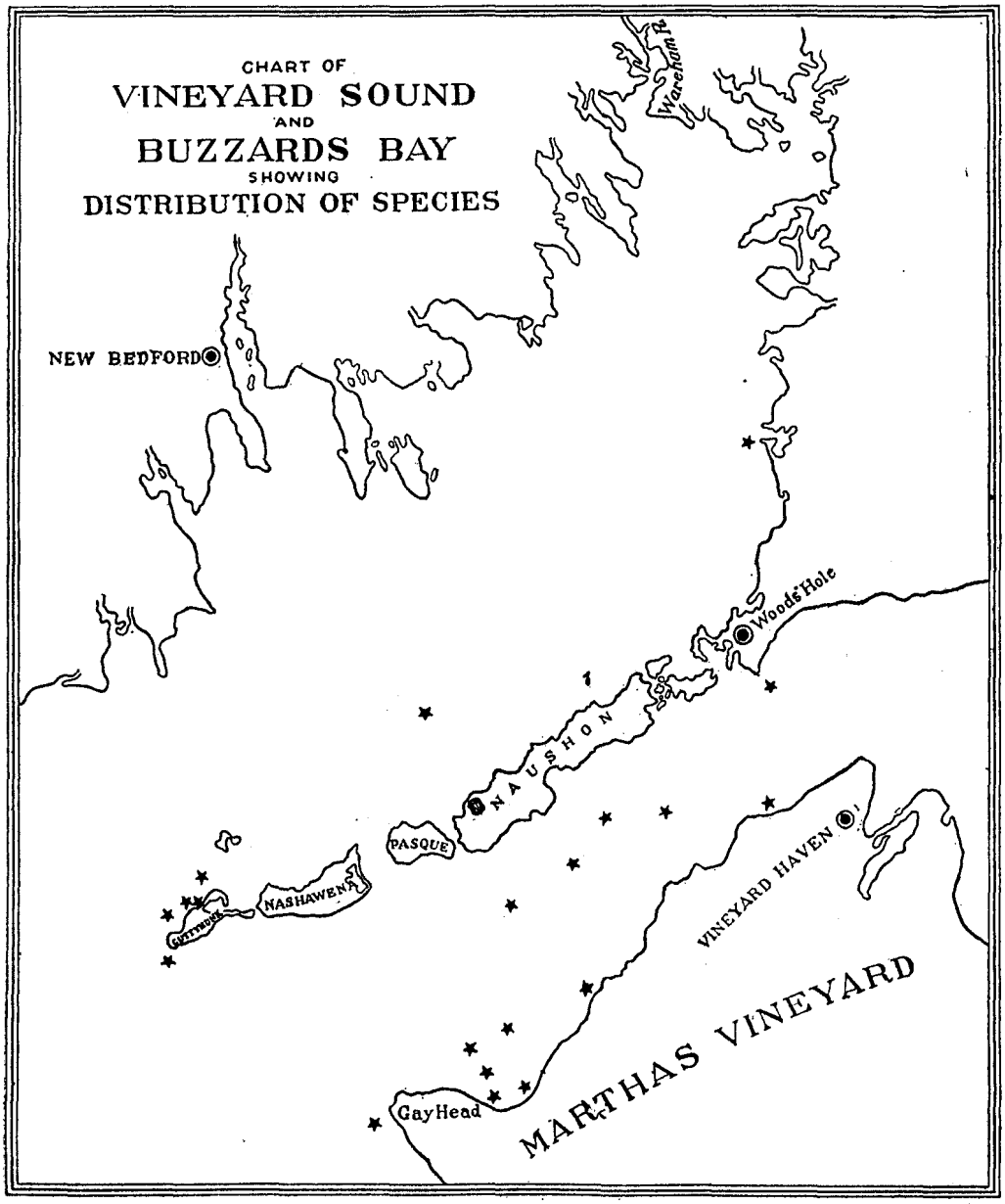

CHART 230.—Arthrocladia villosa (Hudson) Duby.

This species, formerly considered rather rare, is widely distributed and at certain stations even plentiful.

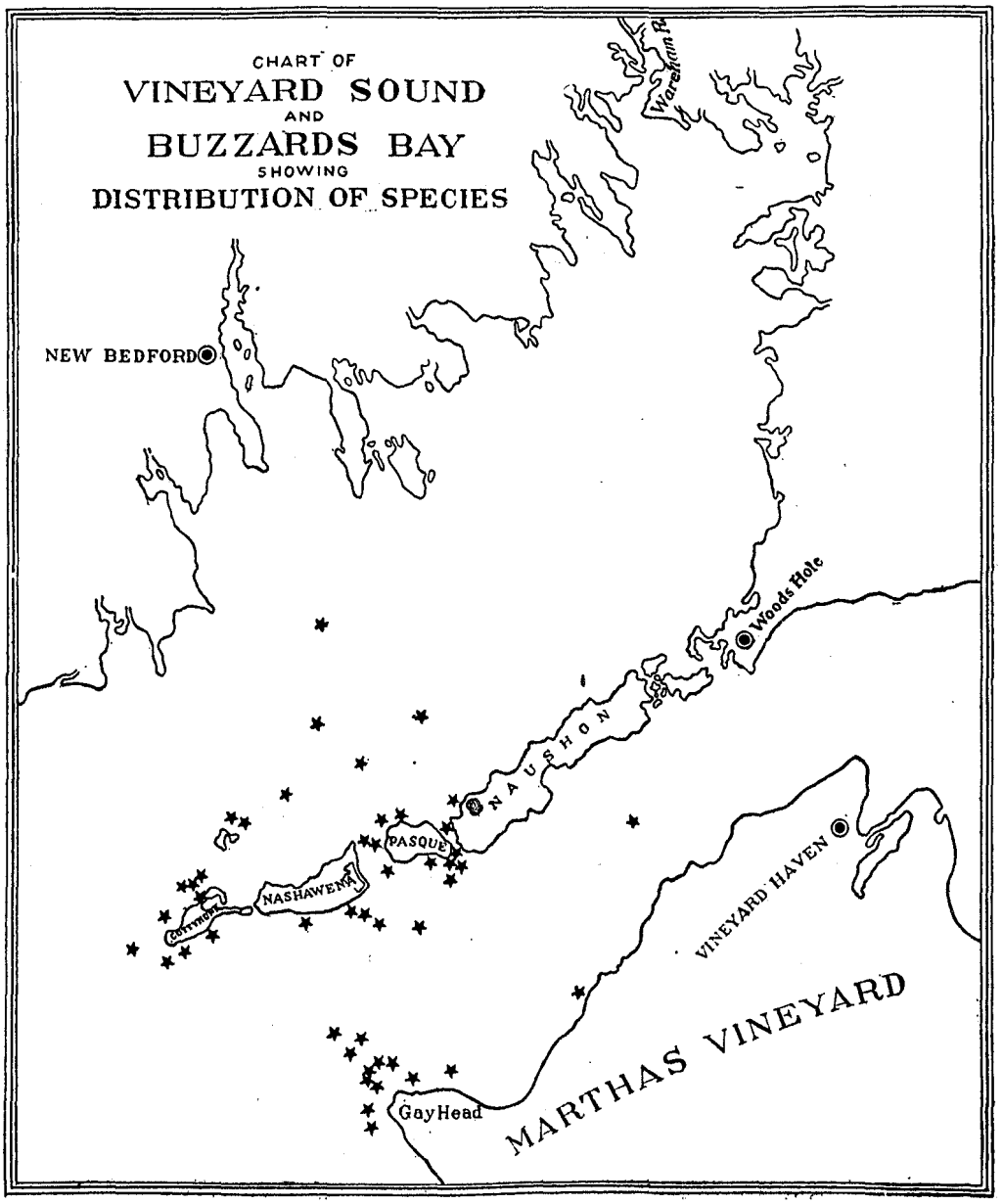

CHART 231.—Desmarestia aculeata (Linnæus) Lamouroux.

This large species is almost restricted to the deeper and cooler waters of the lower portion of Buzzards Bay and westerly portion of Vineyard Sound.

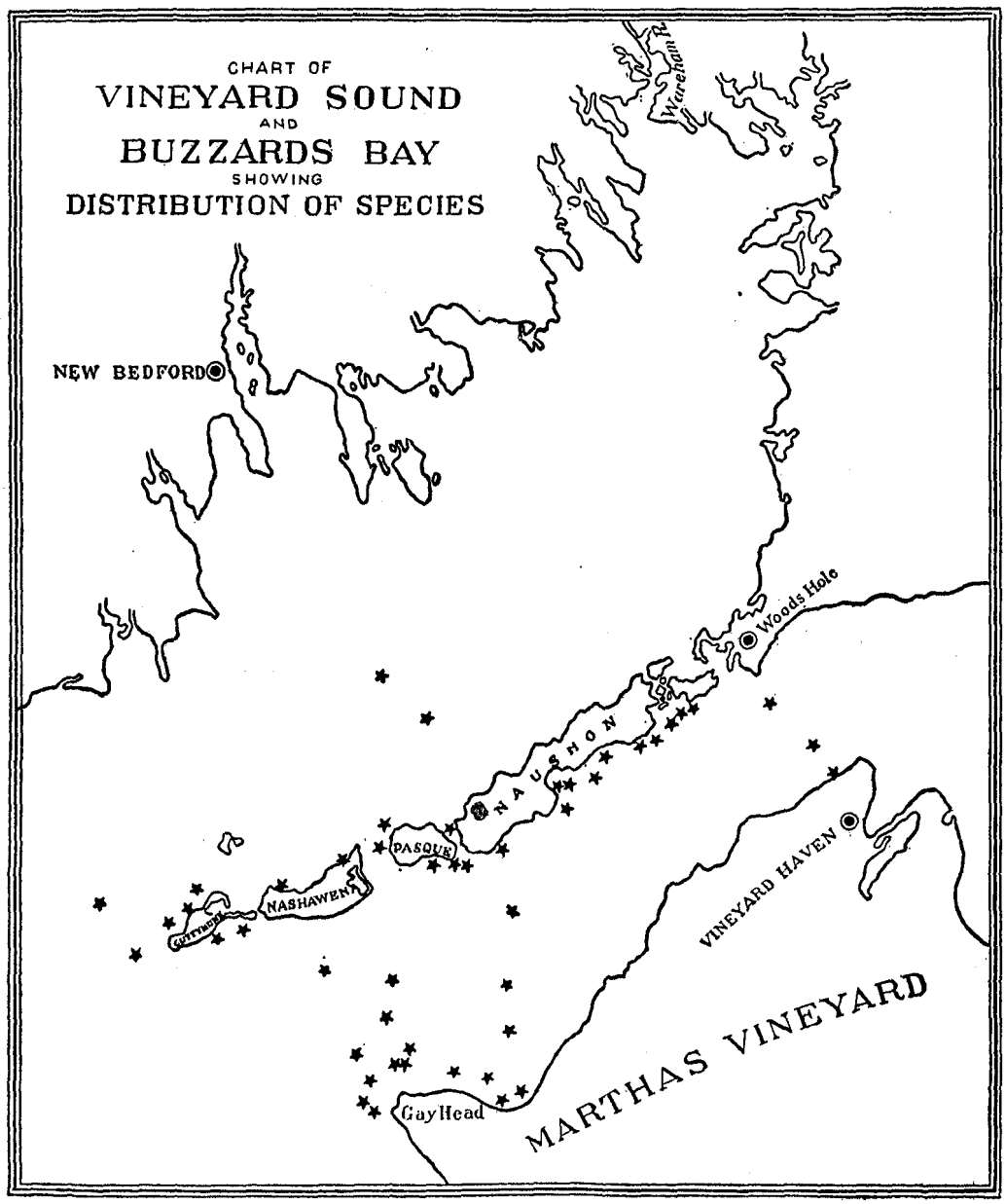

CHART 232.—Desmarestia viridis (Flora Danica) Lamouroux.

Presents a much more extended range than *Desmarestia aculeata* (chart 231), being found in warmer regions of Vineyard Sound as well as in the cooler waters.

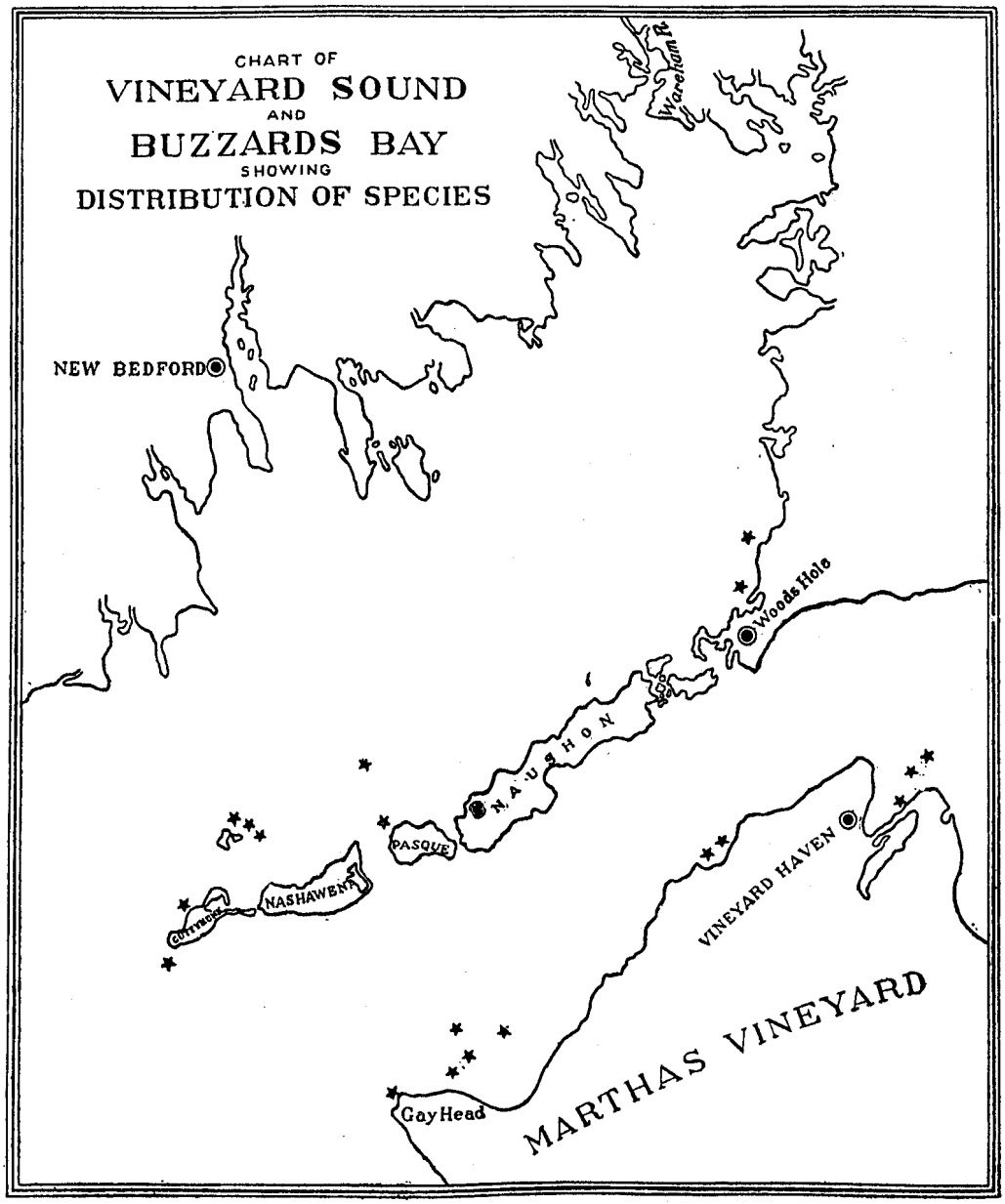

CHART 233.—Dictyosiphon hippuroides (Lyngbye) Areschoug.

A scattered distribution in both Buzzards Bay and Vineyard Sound.

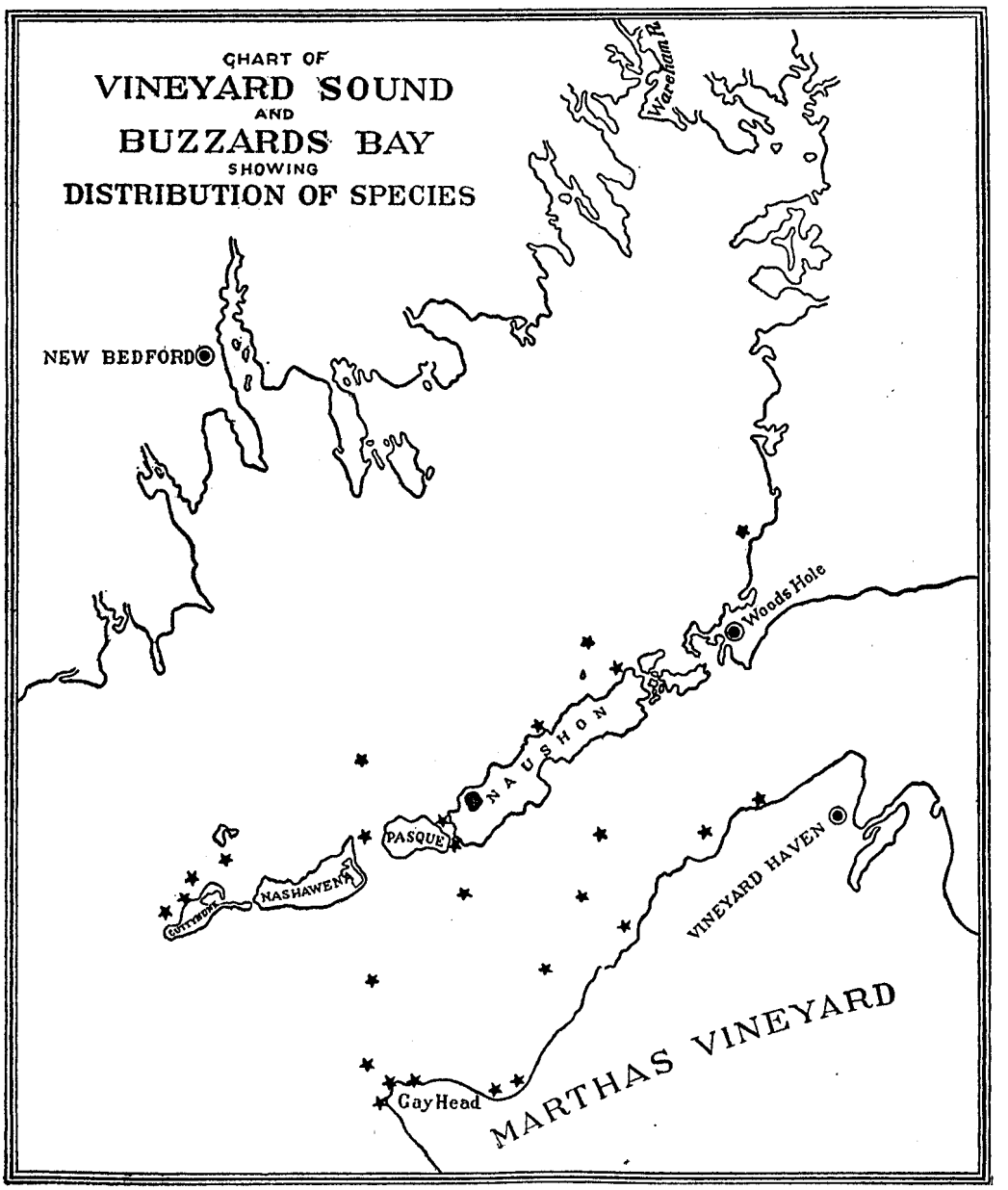

CHART 234.—Chorda filum (Linnæus) Stackhouse.

This species, very common in quiet shallow waters, is also widely distributed in the deeper waters of both Buzzards Bay and Vineyard Sound.

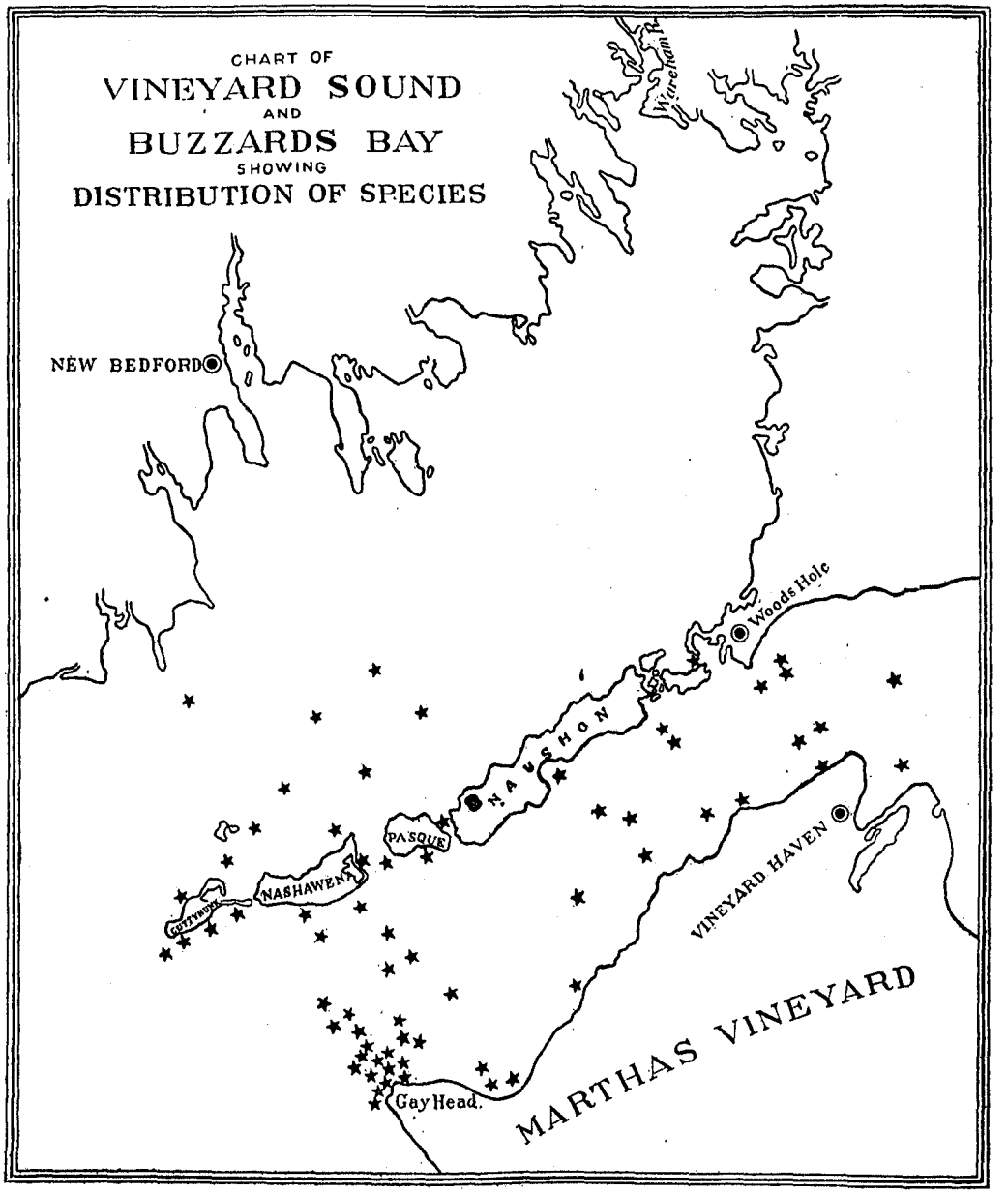

CHART 235.—Laminaria Agardhii Kjellman.

Widely distributed in the lower portion of Buzzards Bay and throughout Vineyard Sound, preferring the cooler waters.

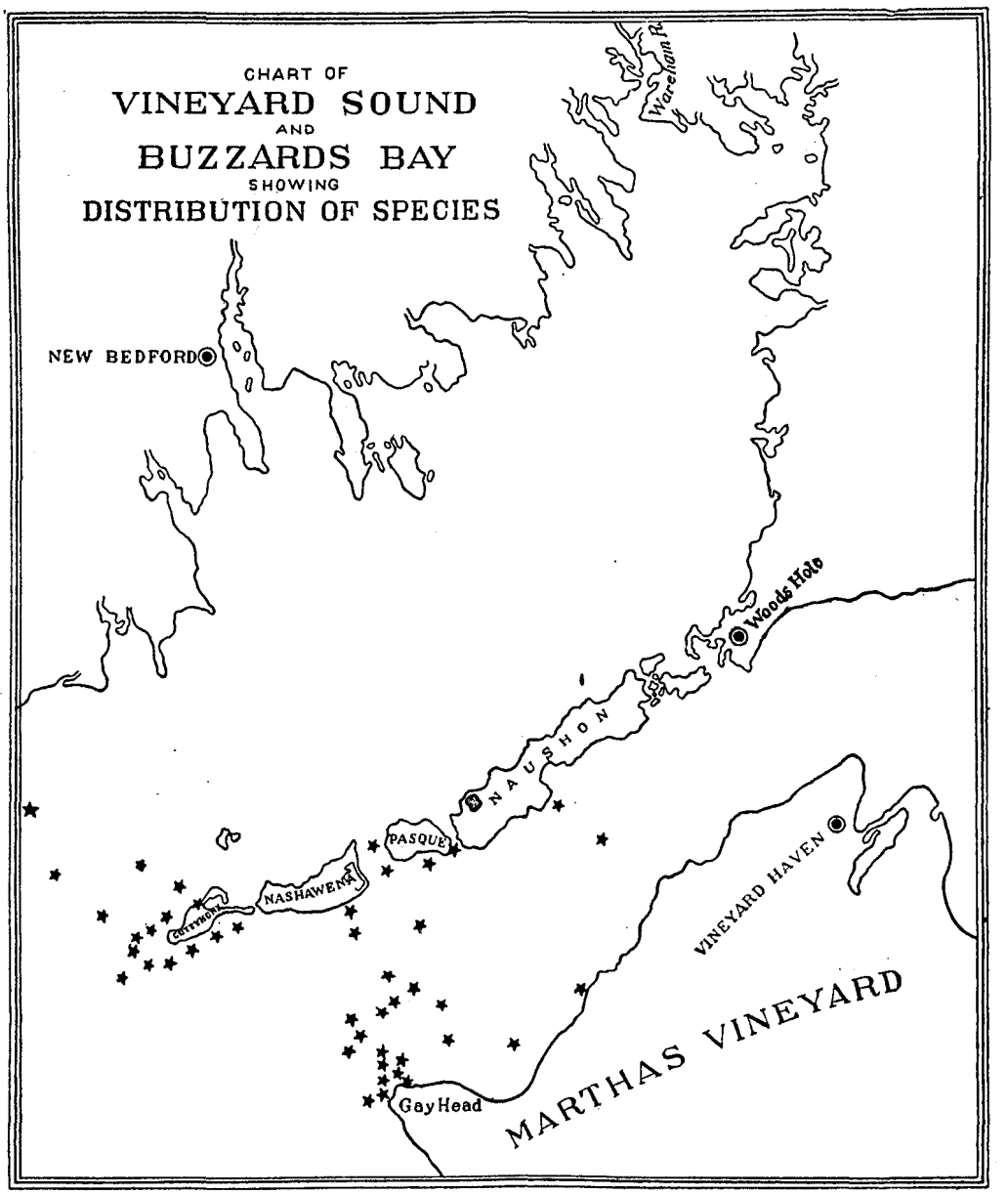

CHART 236.—Laminaria Agardhii, var. vittata Setchell.

This characteristic form of the species (chart 235) is almost restricted to the cooler waters of the lower portion of Buzzards Bay and the westerly portion of Vineyard Sound.

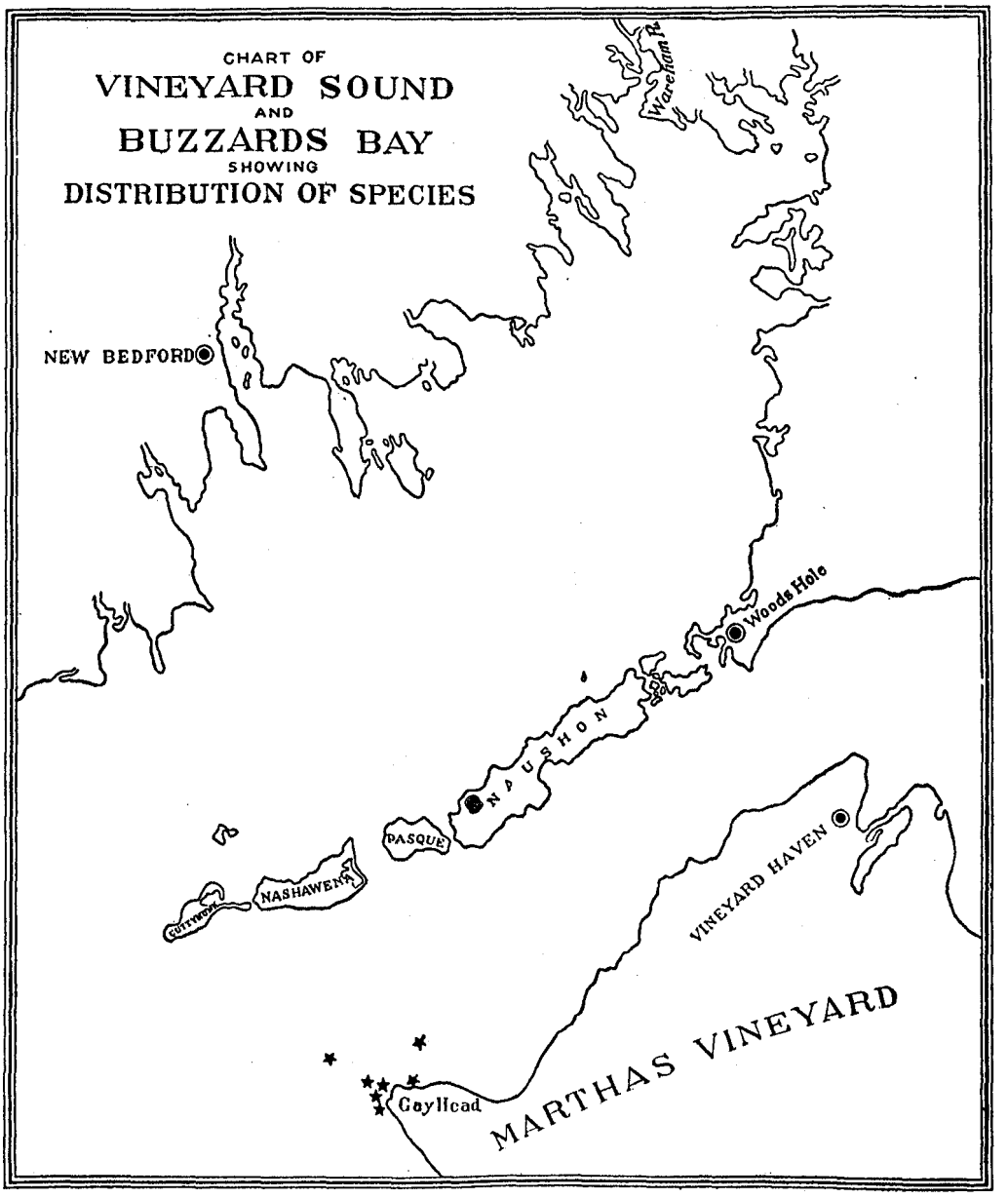

CHART 237.—Laminaria digitata (Linnæus) Lamouroux.

Local distribution limited to the cooler waters off exposed points, as at Gay Head.

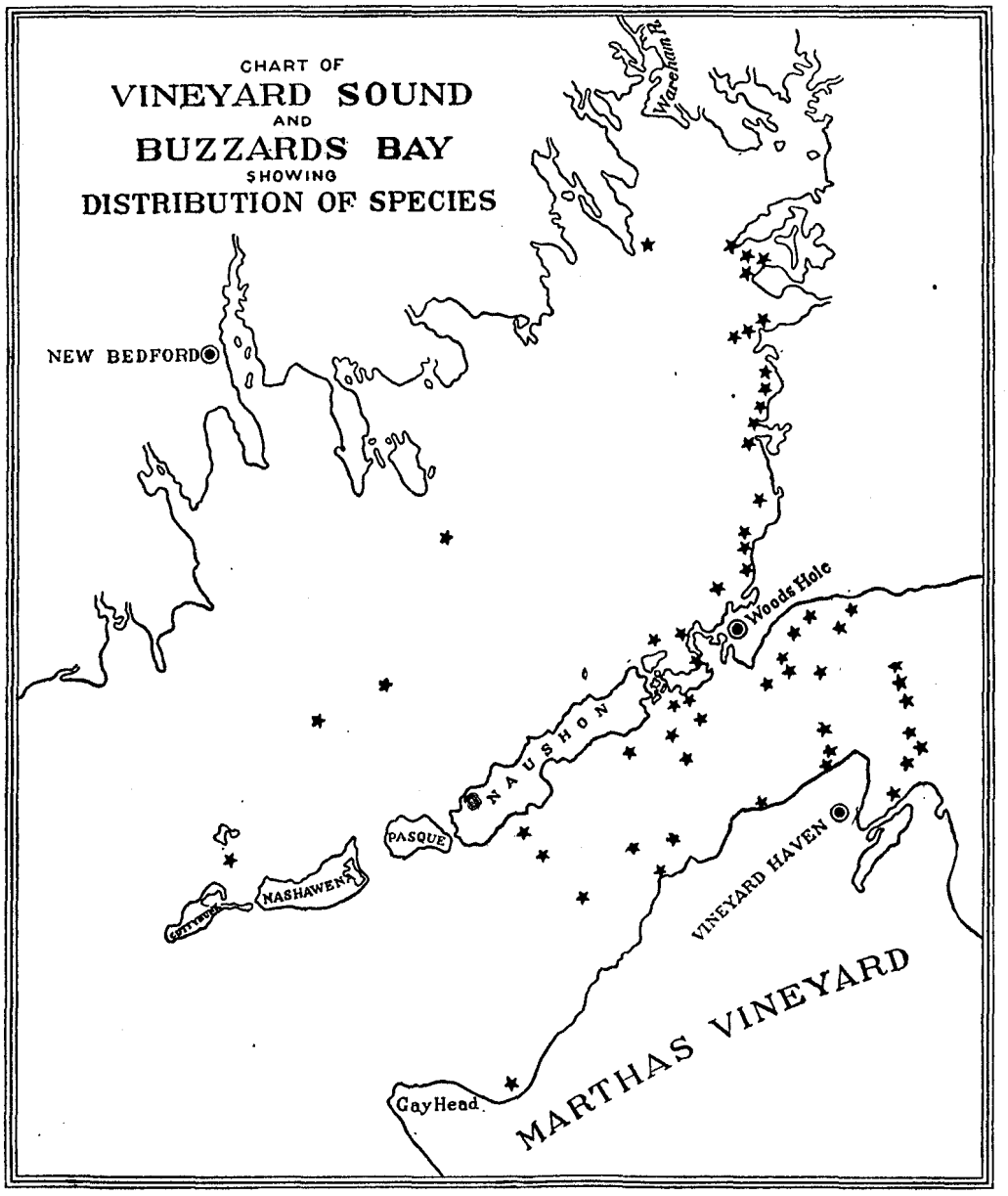

CHART 238.—Sargassum Filipendula Agardh.

Abundant and almost restricted to the warmer and more sheltered regions of Buzzards Bay and Vineyard Sound.

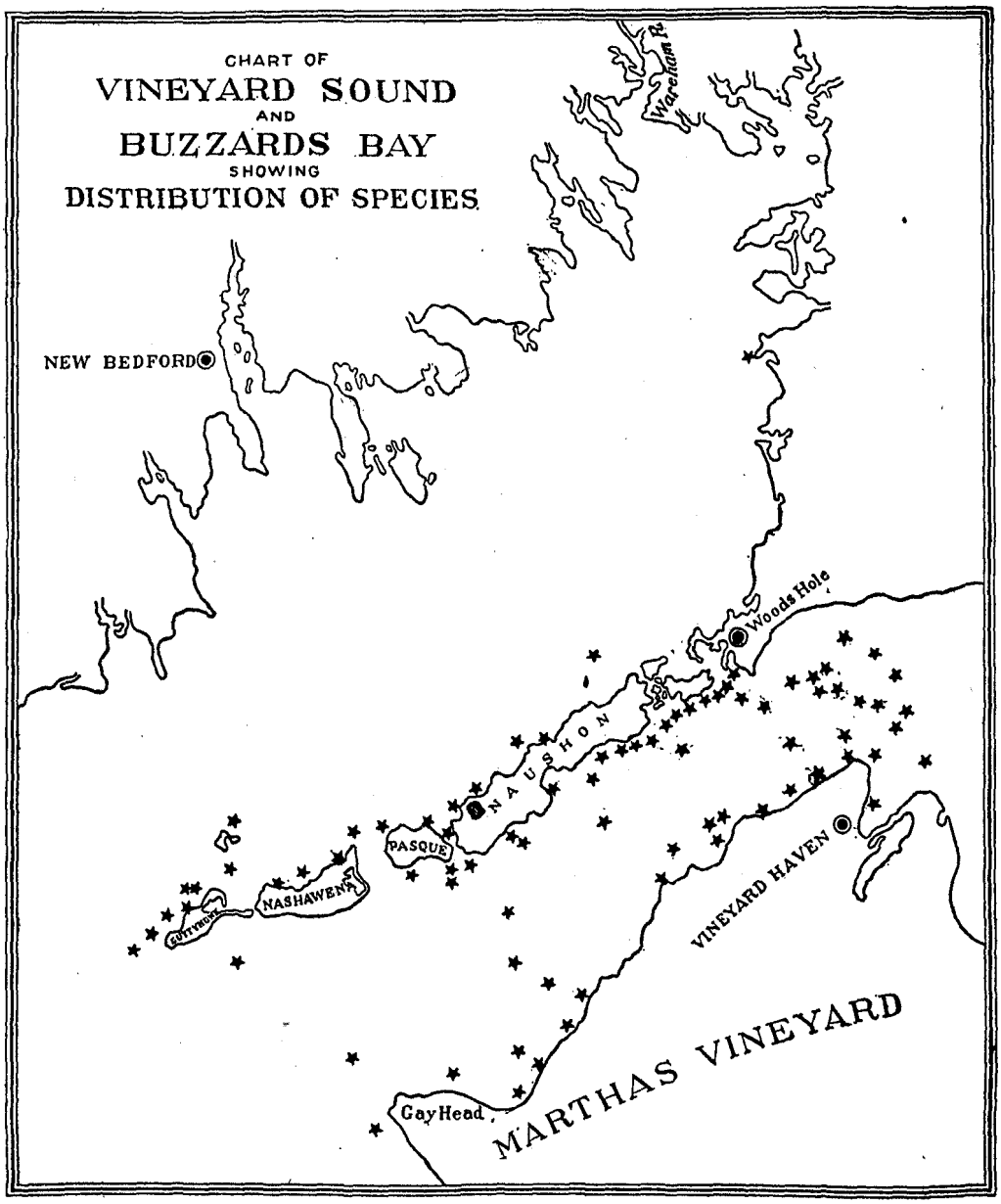

CHART 239.—Antithamnion cruciatum (Agardh) Nägeli.

Widely distributed in both Buzzards Bay and Vineyard Sound over stony bottoms that support extensive growths of *Chondrus*, *Phyllophora*, and *Polyides*, upon which it is a common epiphyte.

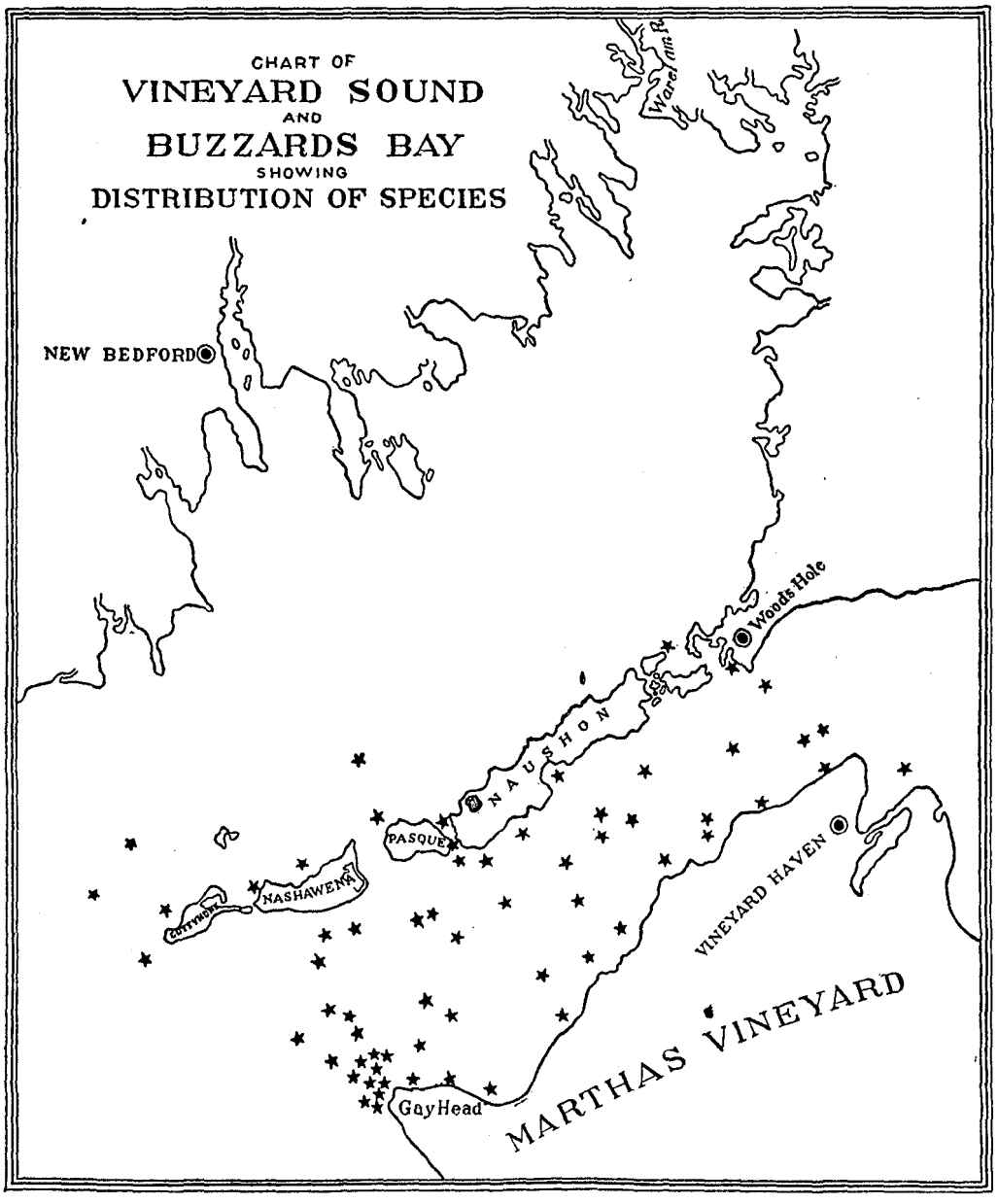

CHART 240.—Ceramium rubrum (Hudson) Agardh.

This very common species of the shallow sublittoral zone is also abundant and widely distributed in the deeper waters.

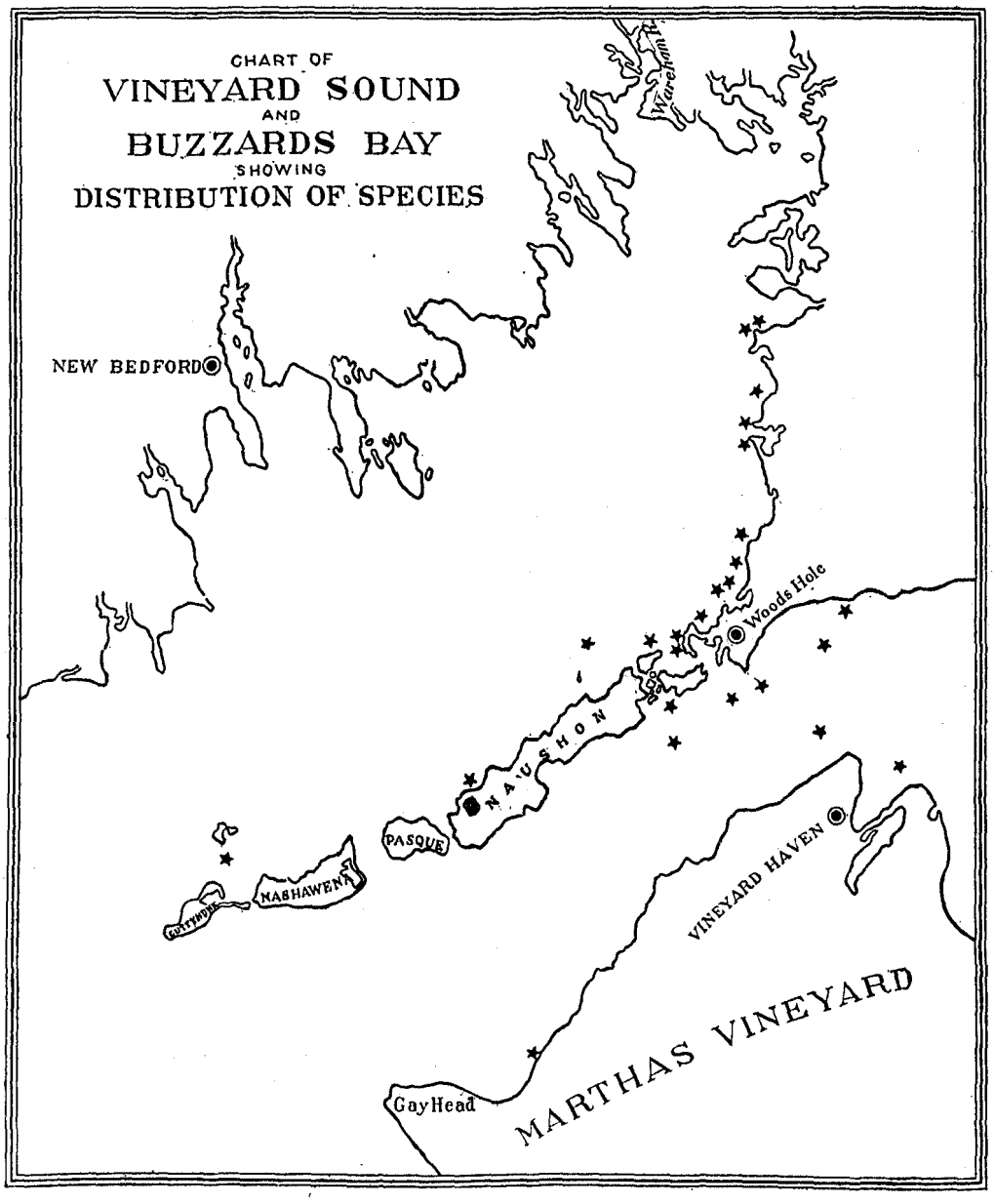

CHART 241.—Griffithsia Bornetiana Farlow.

Local distribution almost restricted to the warmer waters of Buzzards Bay and Vineyard Sound.

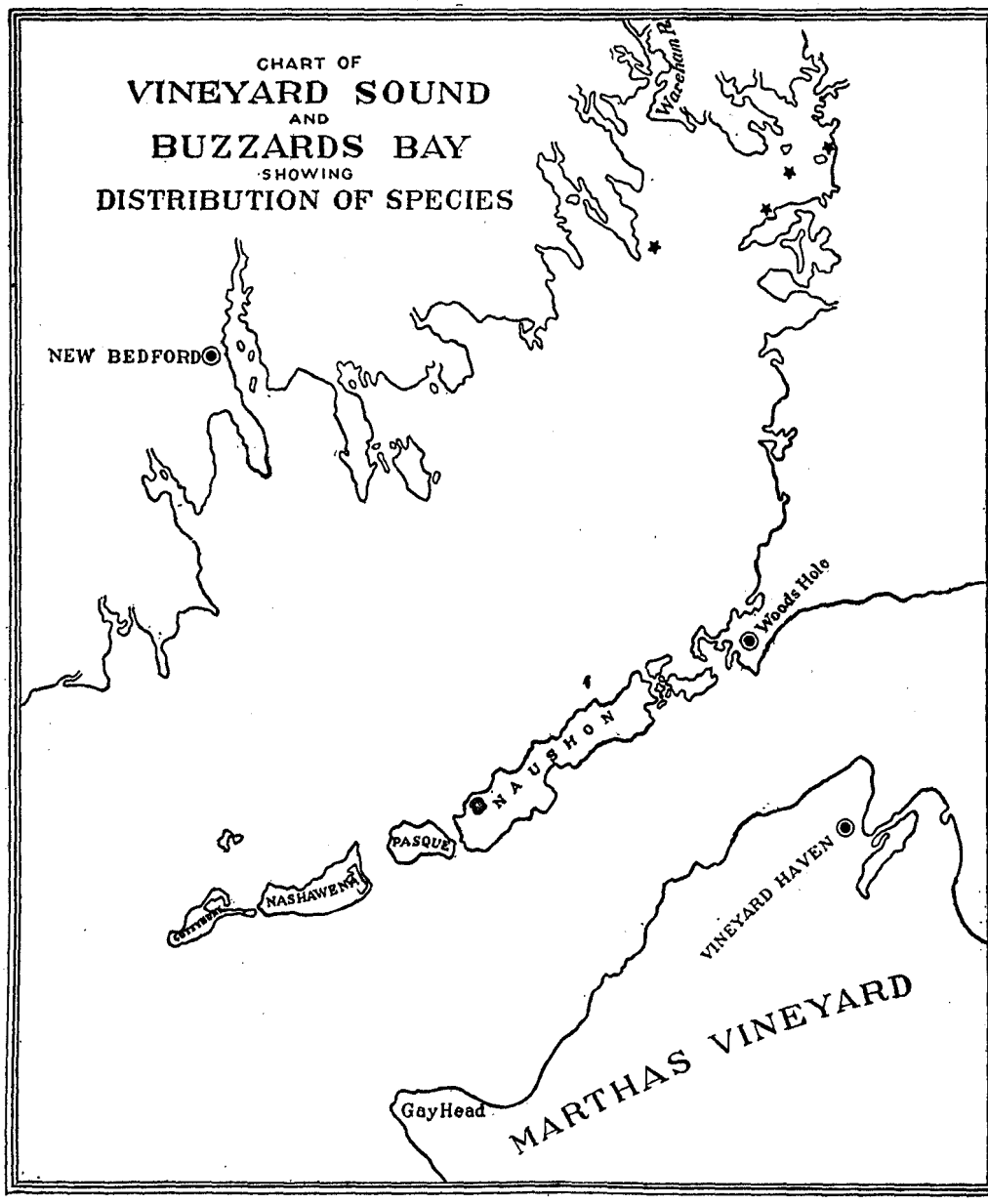

CHART 242.—Griffithsia tenuis Agardh.

Only found in the warm and sheltered portions of Buzzards Bay, where it forms large patches loosely attached over sandy and muddy bottoms.

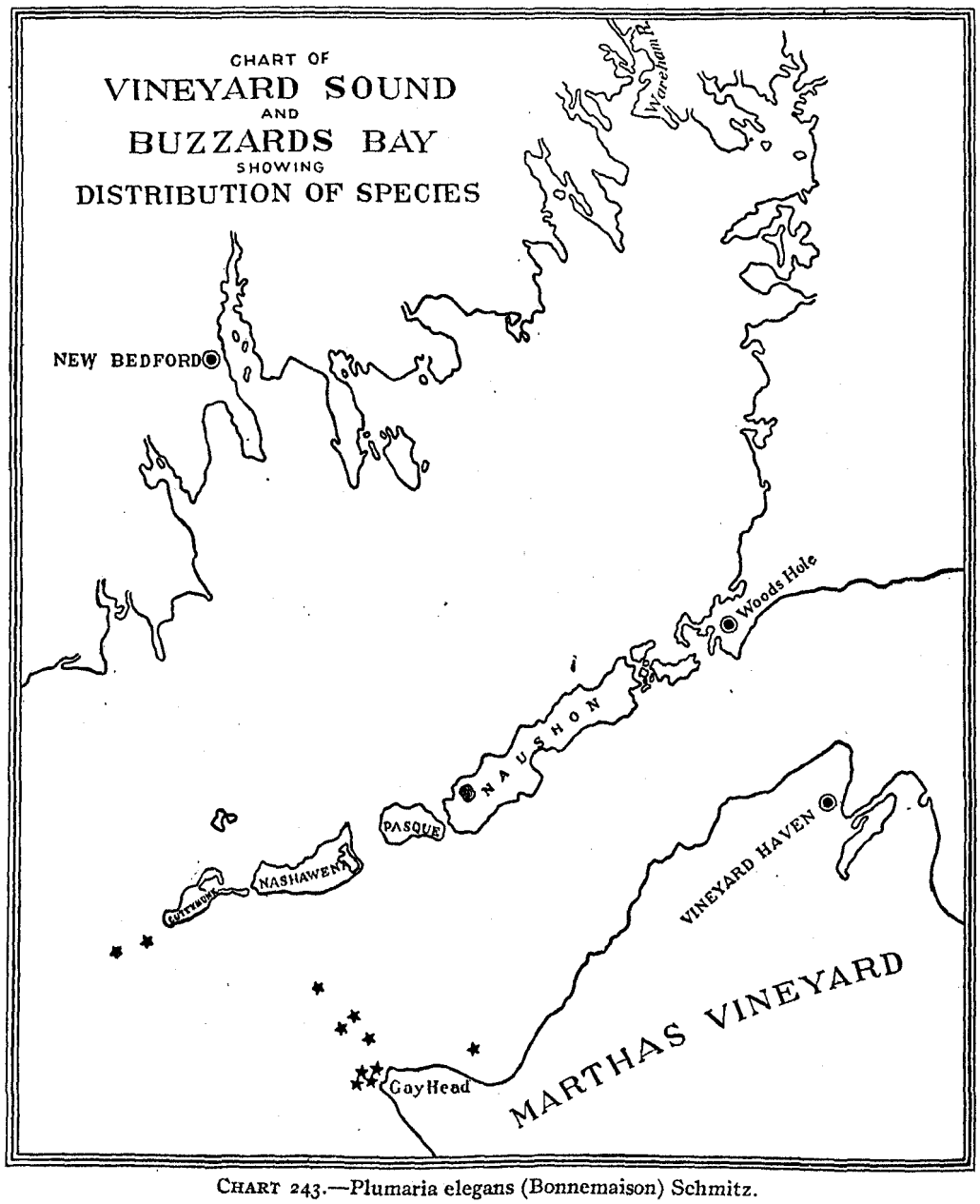

CHART 243.—Plumaria elegans (Bonnemaison) Schmitz.

Local distribution limited to the cooler waters off exposed points, as at Gay Head and Cuttyhunk.

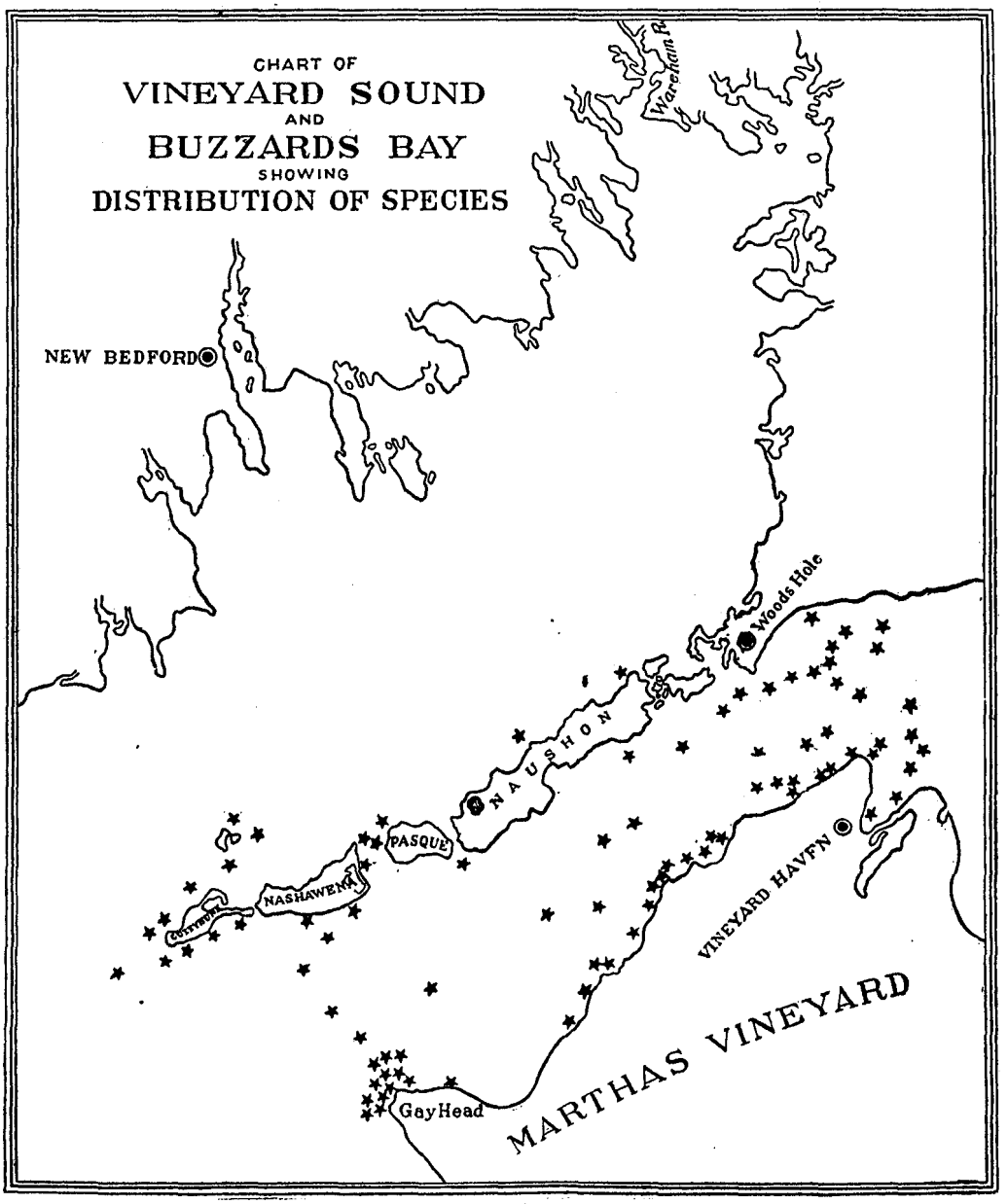

CHART 244.—Spermothamnion Turneri (Mertens) Areschoug.

This striking epiphyte is widely distributed in both Buzzards Bay and Vineyard Sound over bottoms that support growths of *Chondrus*, *Phyllophora*, and *Polyides*.

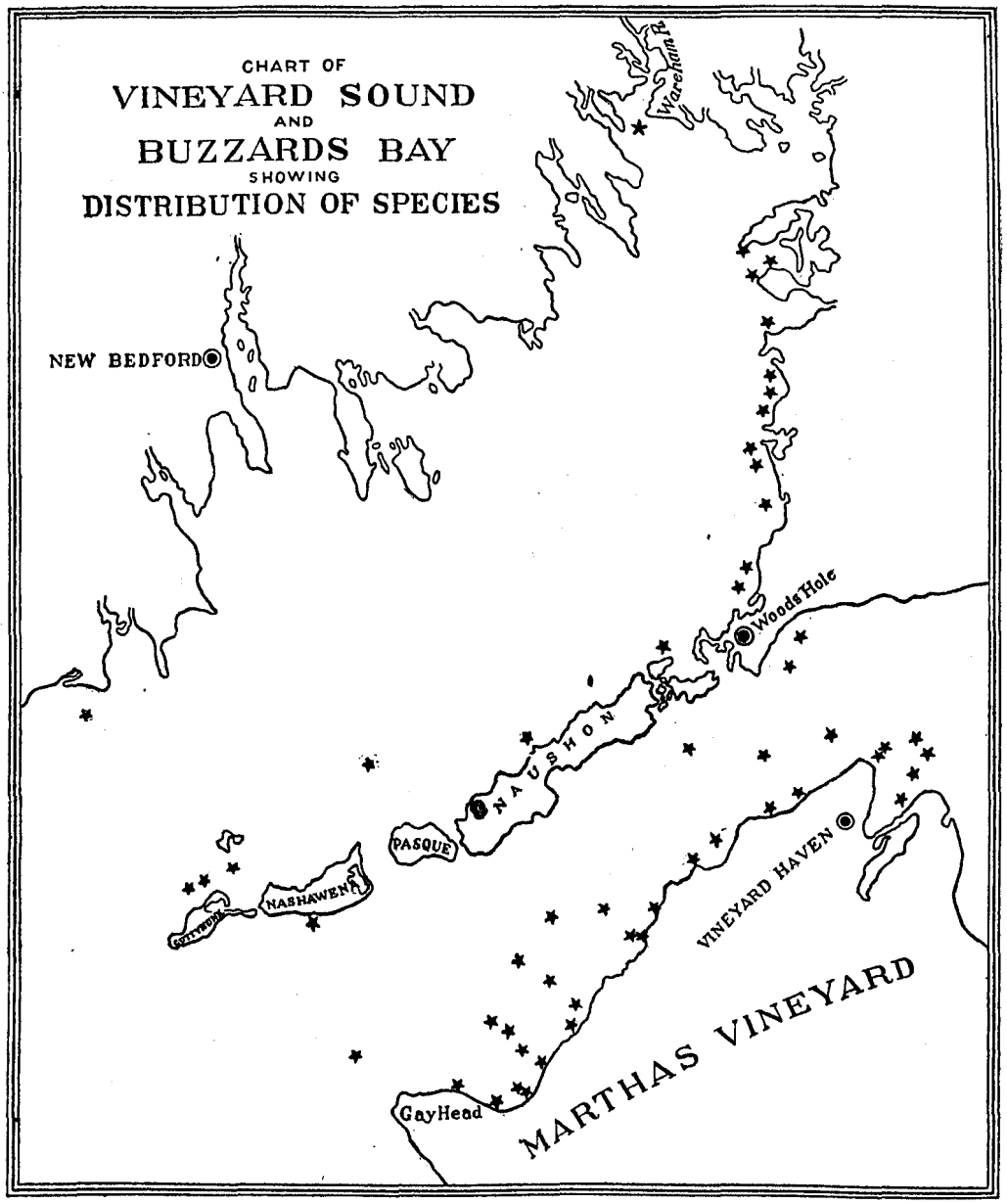

CHART 245.—Spyridia filamentosa (Wulfen) Harvey.

Widely distributed in both Buzzards Bay and Vineyard Sound, but preferring the warmer waters of the more sheltered portions.

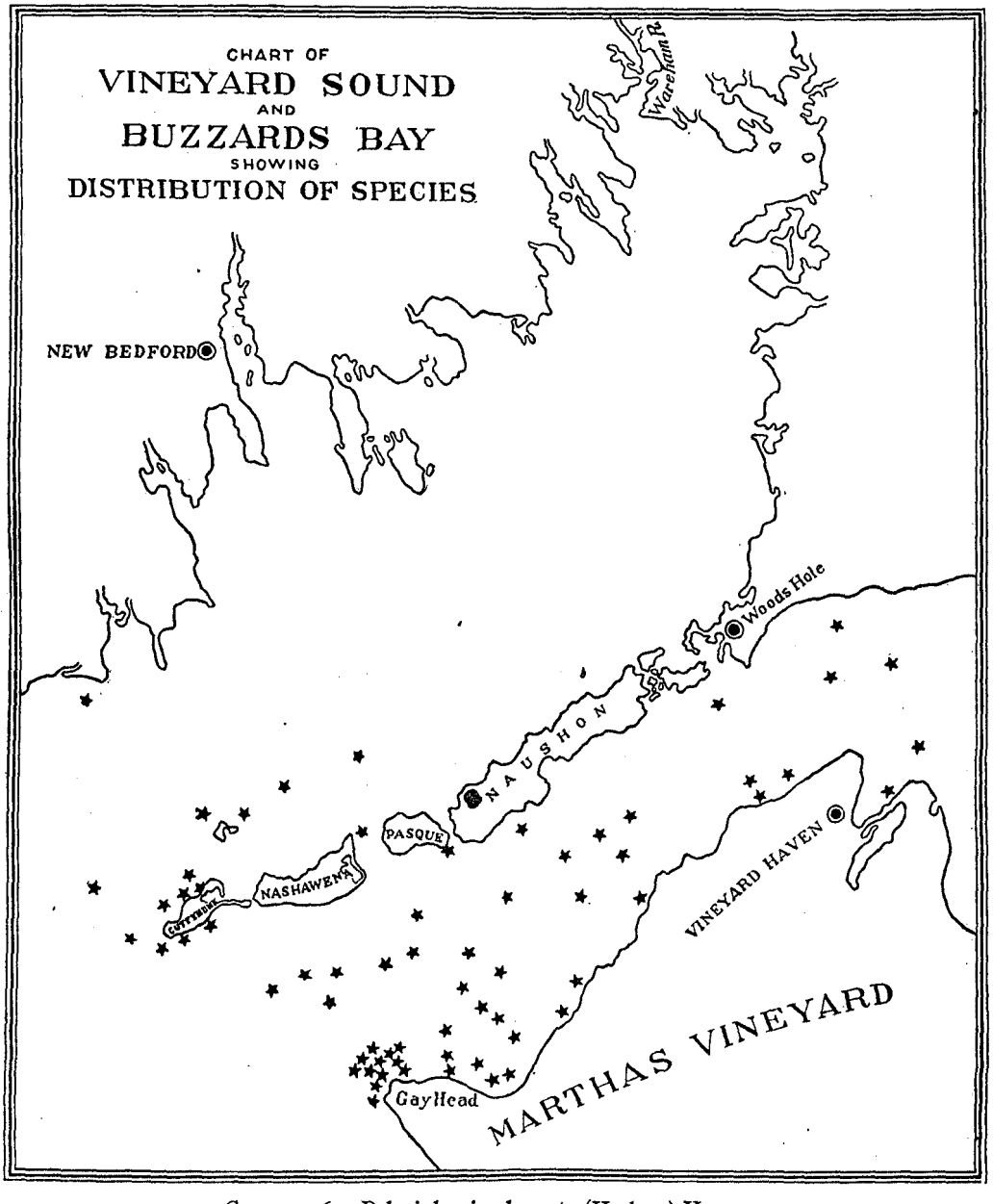

CHART 246.—Polysiphonia elongata (Hudson) Harvey.

Prefers the cooler waters of the lower portion of Buzzards Bay and the westerly portion of Vineyard Sound, but presents a somewhat scattered distribution.

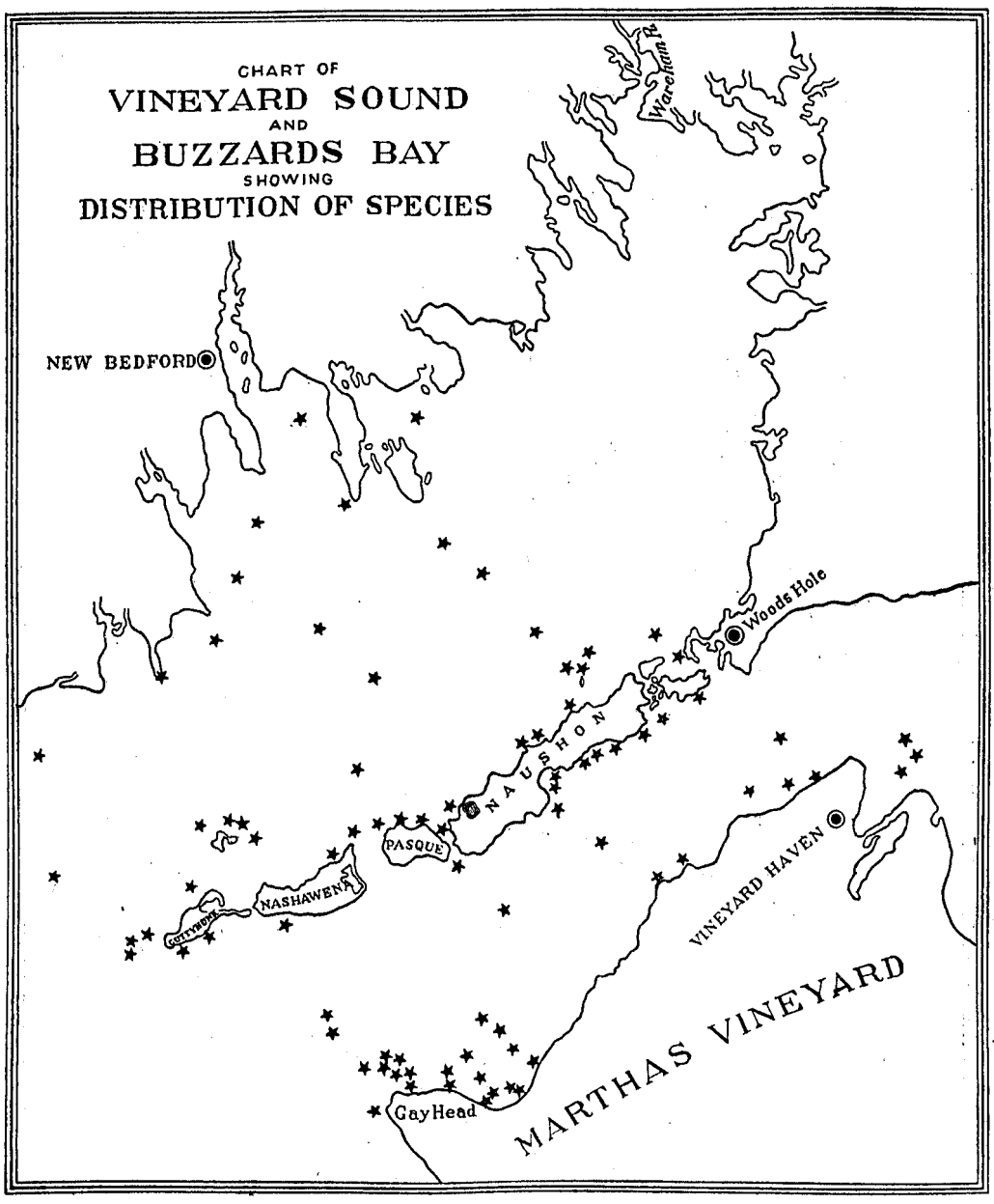

CHART 247.—Polysiphonia nigrescens (Dillwyn) Greville.

A species abundant and widely distributed, growing on stones and shells frequently over muddy bottoms, which accounts for its presence in the middle regions of Buzzards Bay.

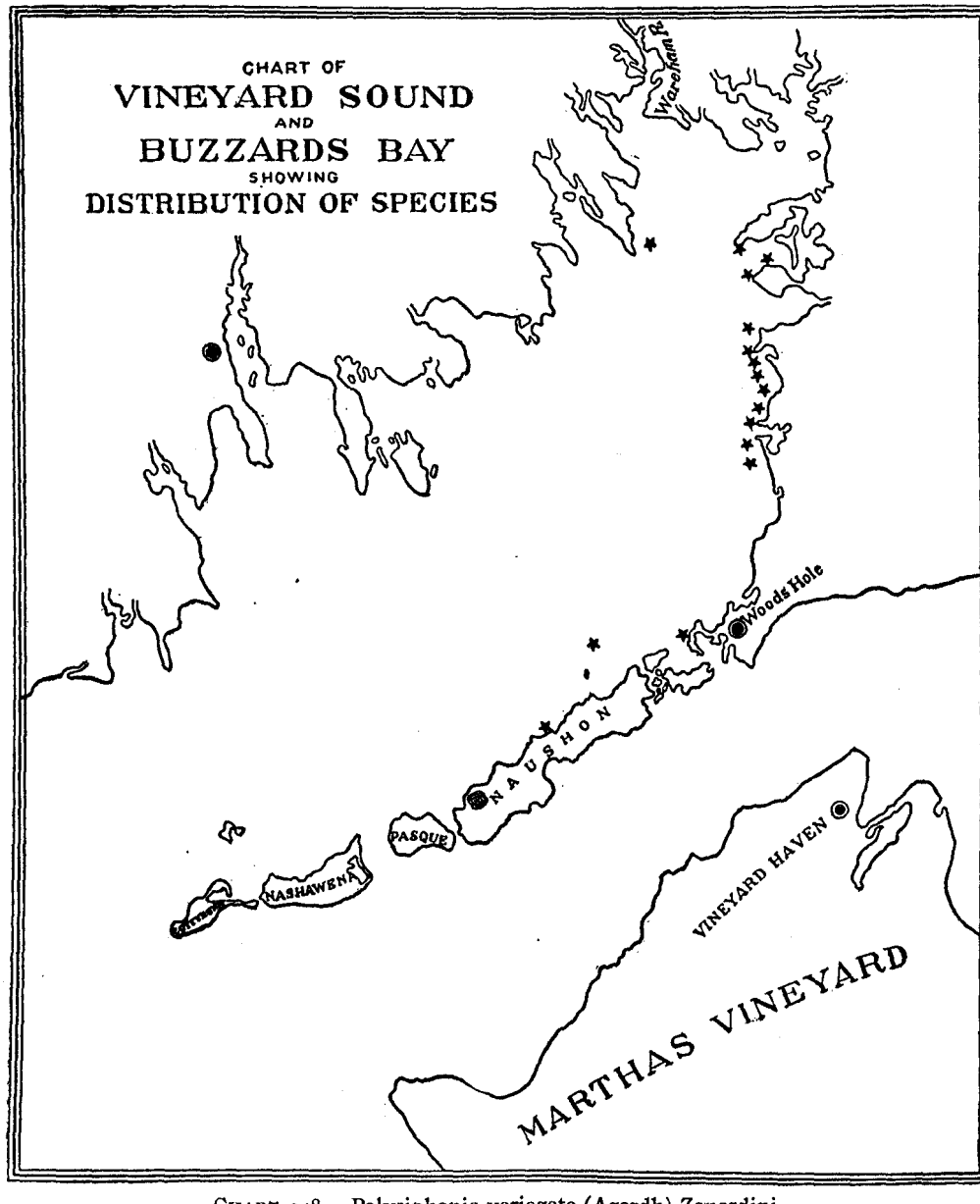

CHART 248.—*Polysiphonia variegata* (Agardh) Zanardini.

Restricted to the warmer waters of sheltered regions and only dredged by the Survey in Buzzards Bay.

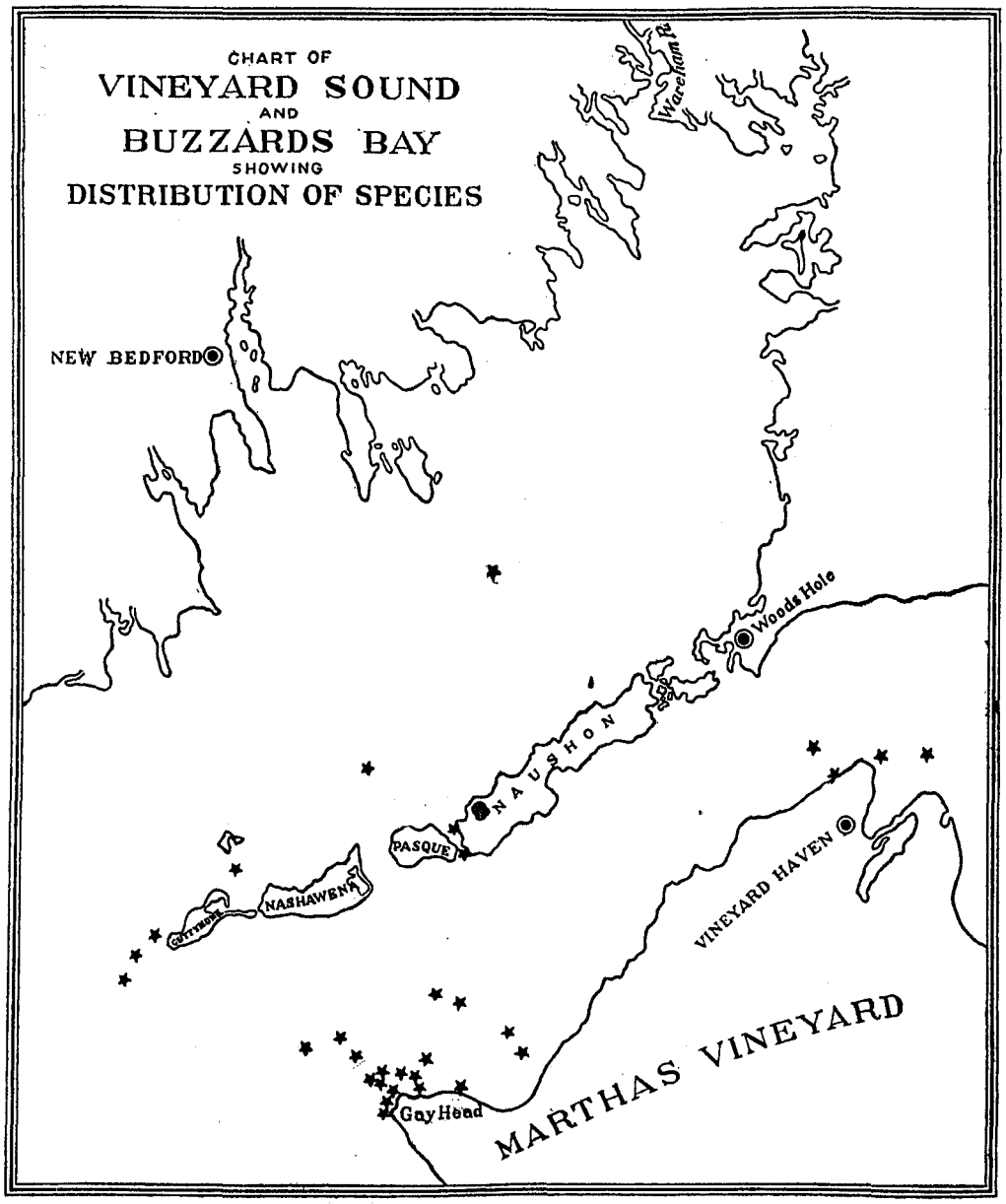

CHART 249.—Ahnfeldtia plicata (Turner) Fries.

Prefers the cooler waters off exposed points.

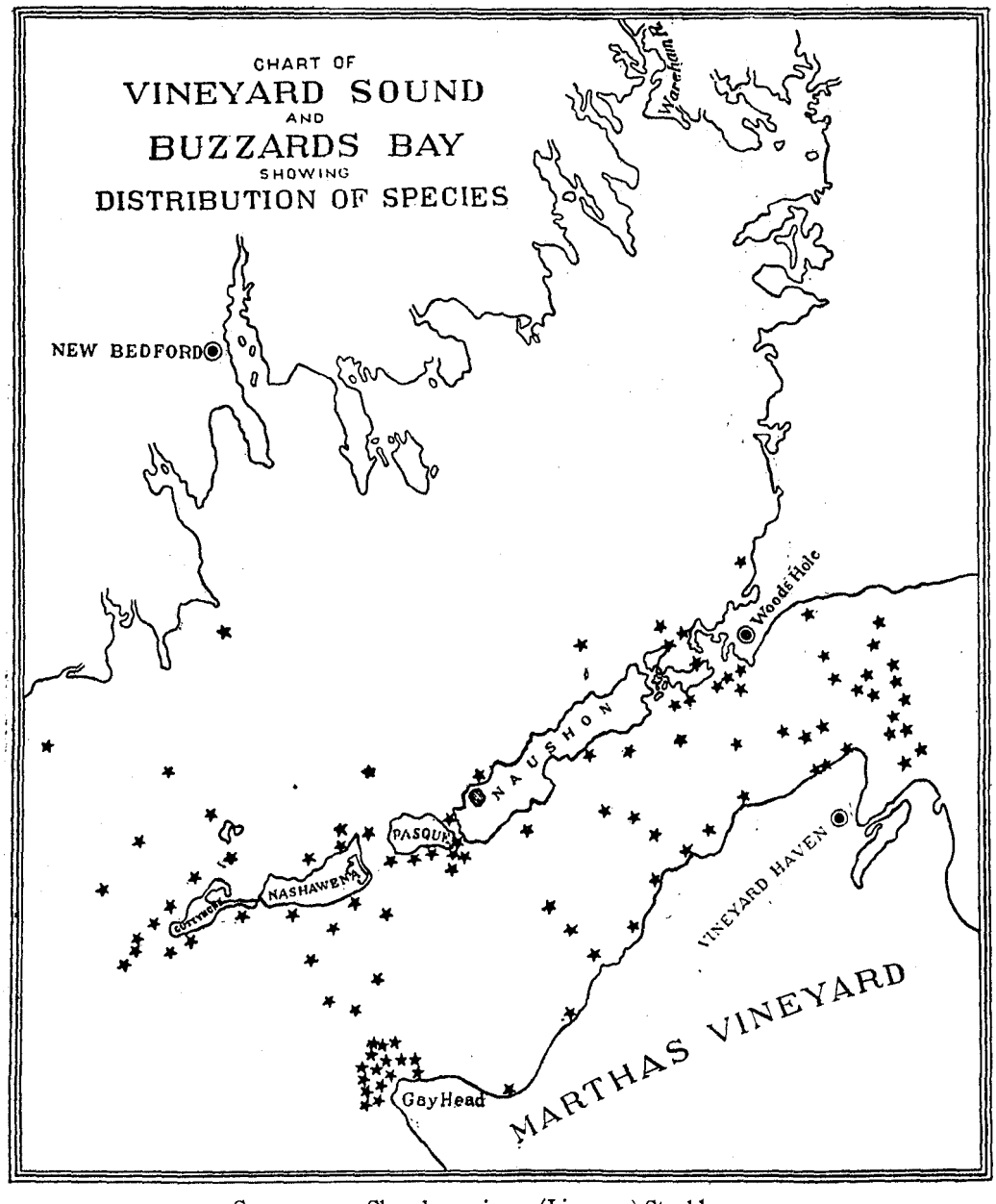

CHART 250.—Chondrus crispus (Linnæus) Stackhouse.

Widely distributed over sandy, shelly, and stony bottoms.

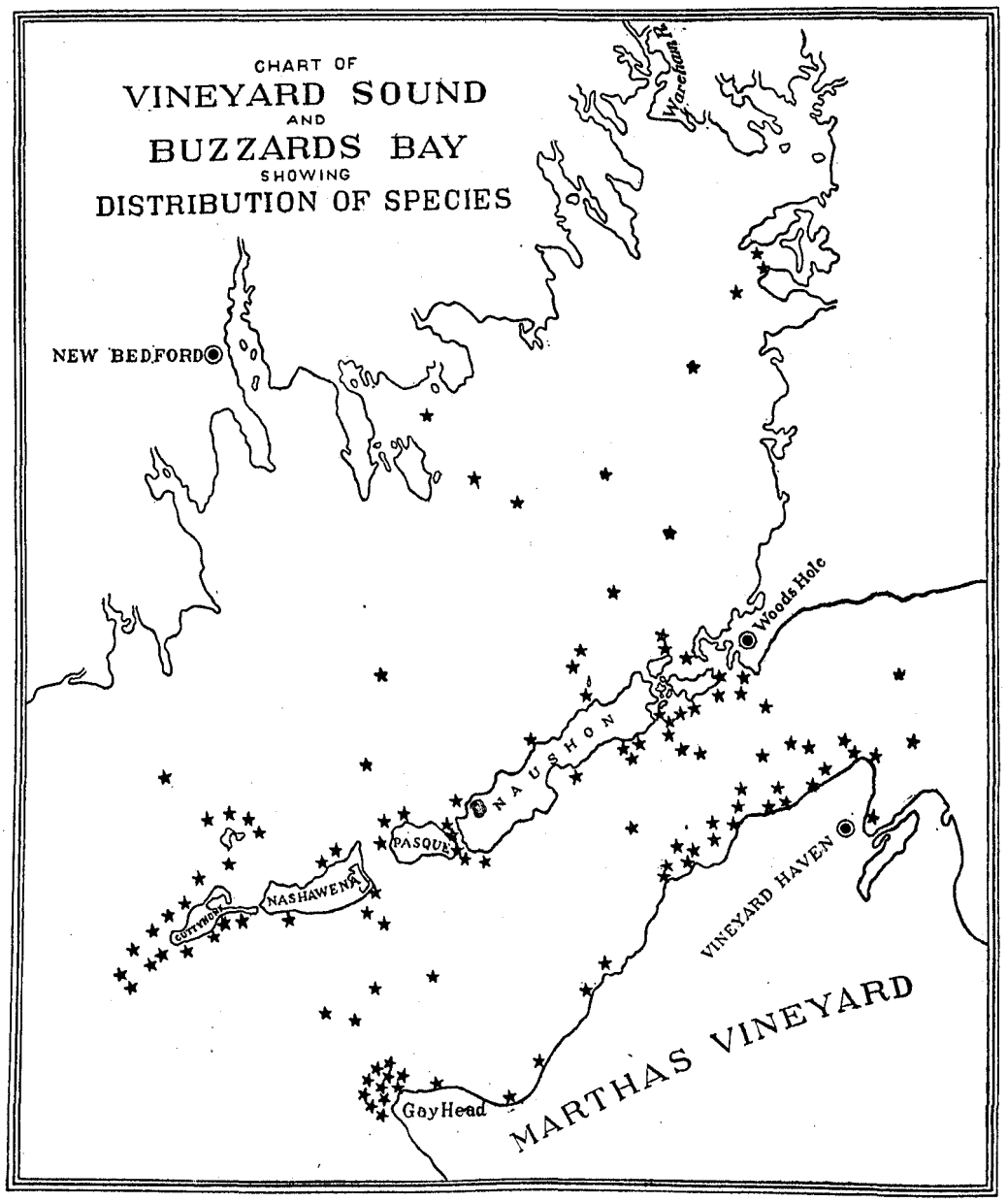

CHART 251.—Phyllophora Brodiæi (Turner) J. Agardh.

Very generally distributed throughout Buzzards Bay and Vineyard Sound but most abundant in exposed situations.

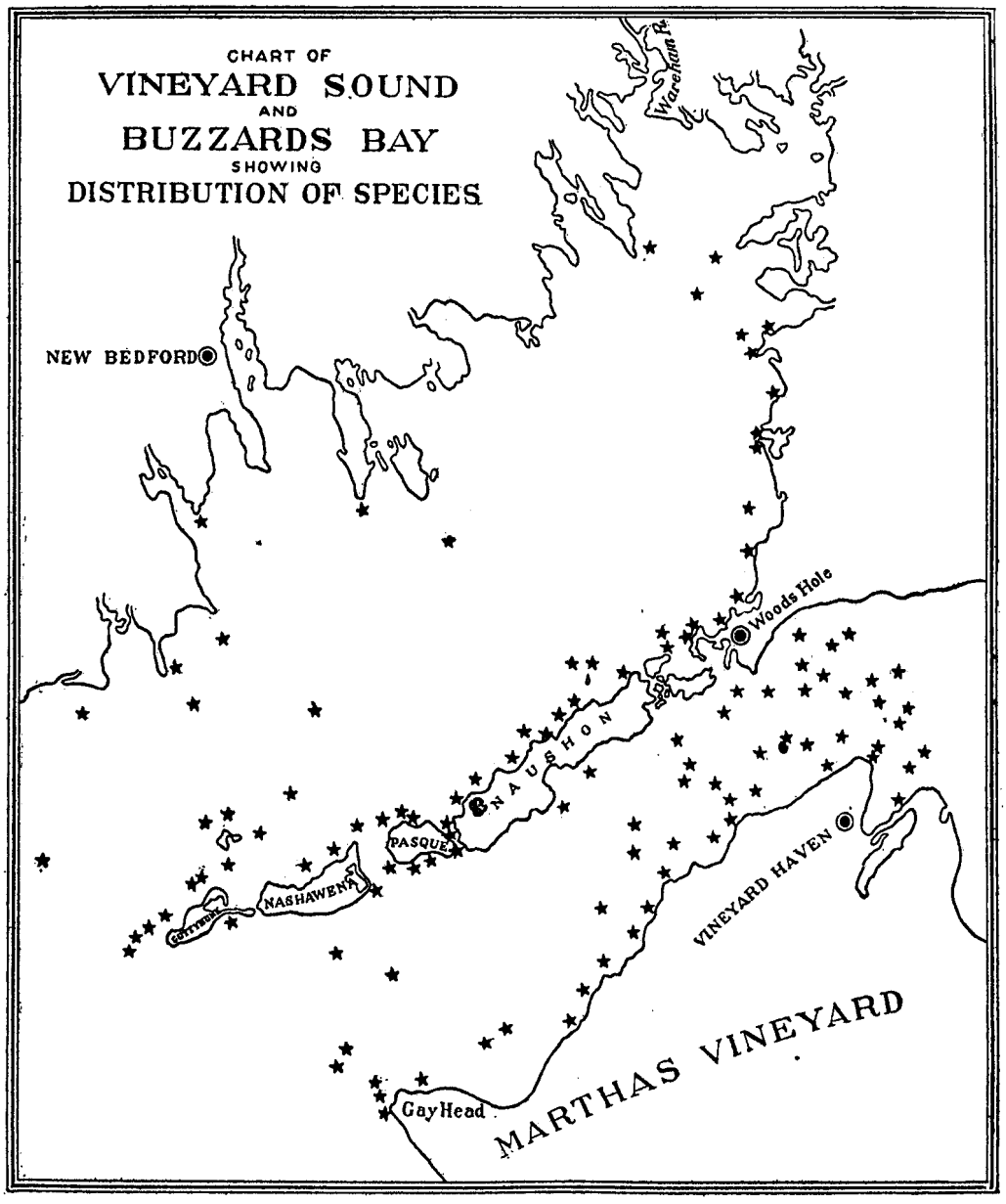

CHART 252.—Phyllophora membranifolia (Goodenough & Woodward) J. Agardh.

As widely distributed as *Phyllophora Brodiæi* (chart 251) but apparently showing a preference for more sheltered regions.

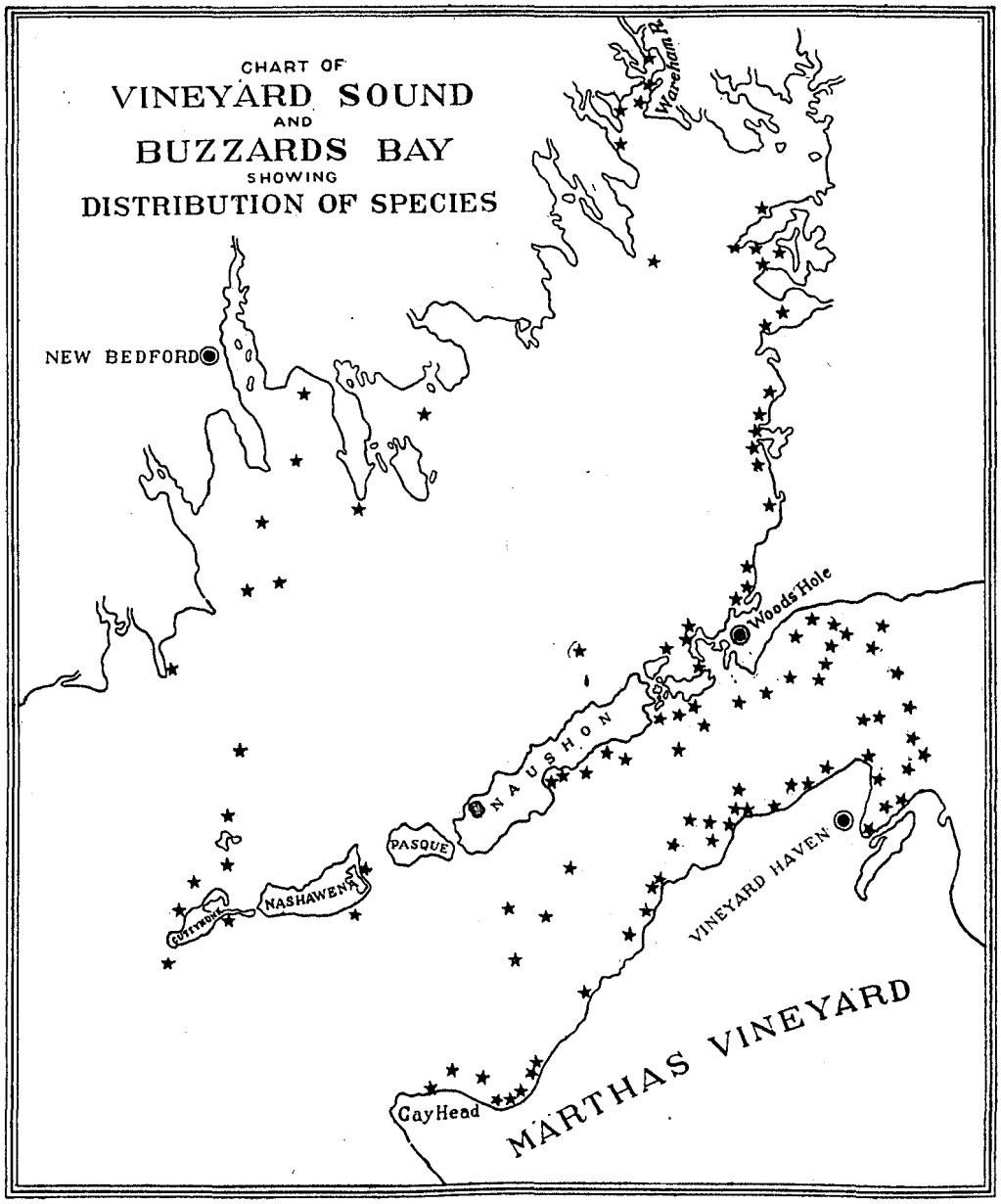

CHART 253.—Agardhiella tenera (J. Agardh) Schmitz.

A very common and widely distributed species which, however, prefers warm and sheltered waters.

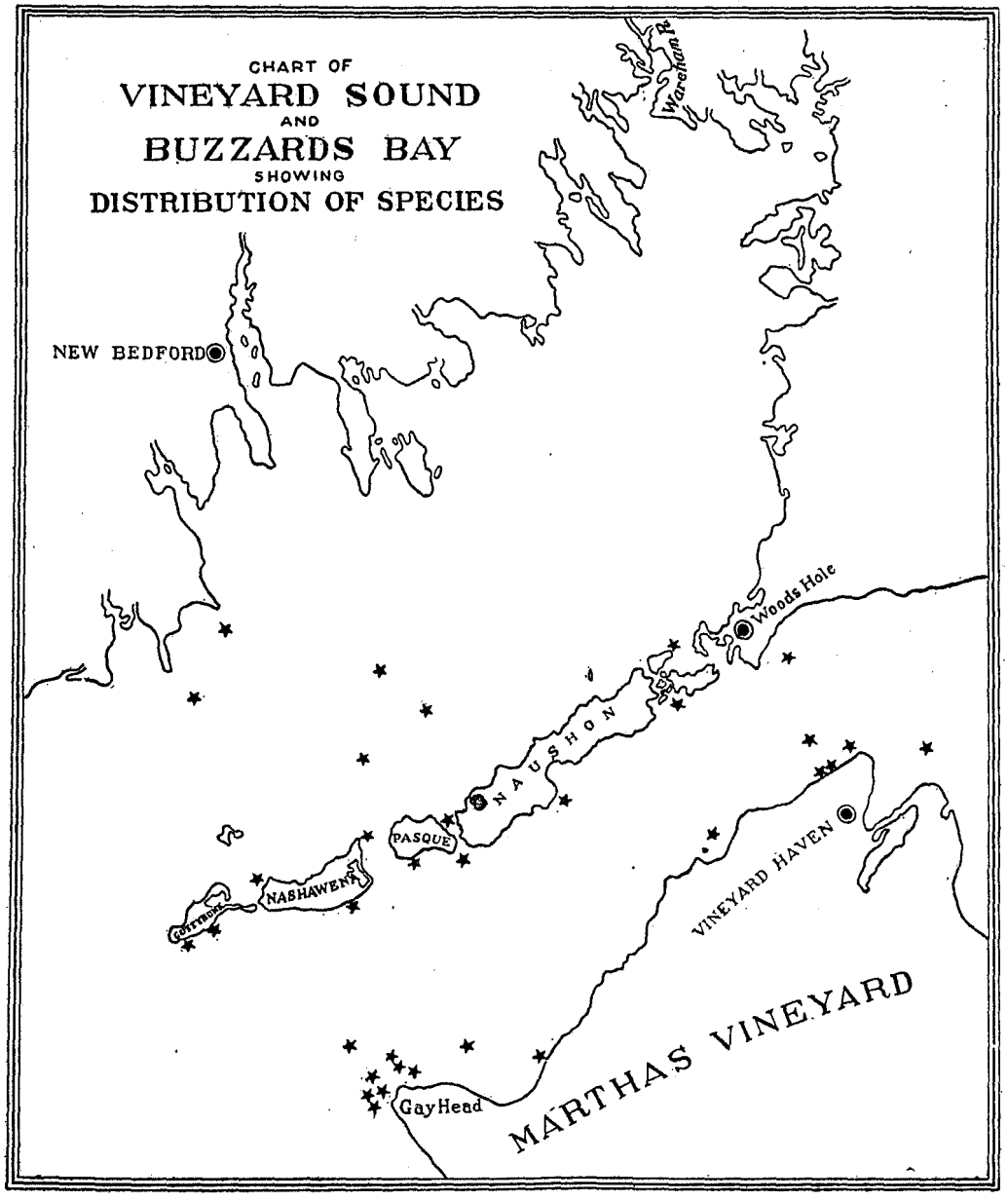

CHART 254.—Cystoclonium purpurascens (Hudson) Kützing.

A scattered distribution in both Buzzards Bay and Vineyard Sound.

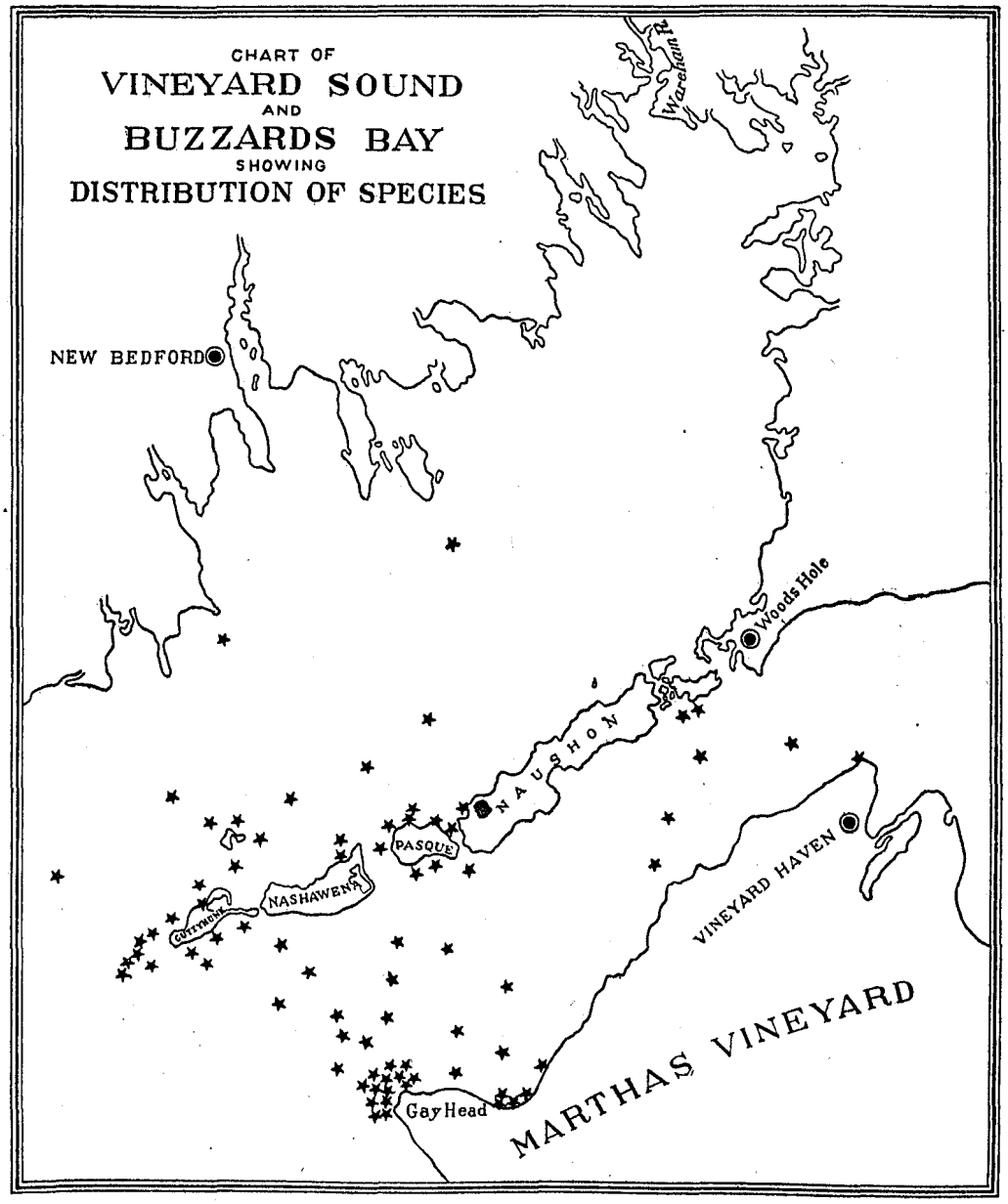

CHART 255.—Cystoclonium purpurascens var. cirrhosum Harvey.

This form of the species (chart 254) shows a marked preference for the cooler waters of the lower portion of Buzzards Bay and the westerly portion of Vineyard Sound.

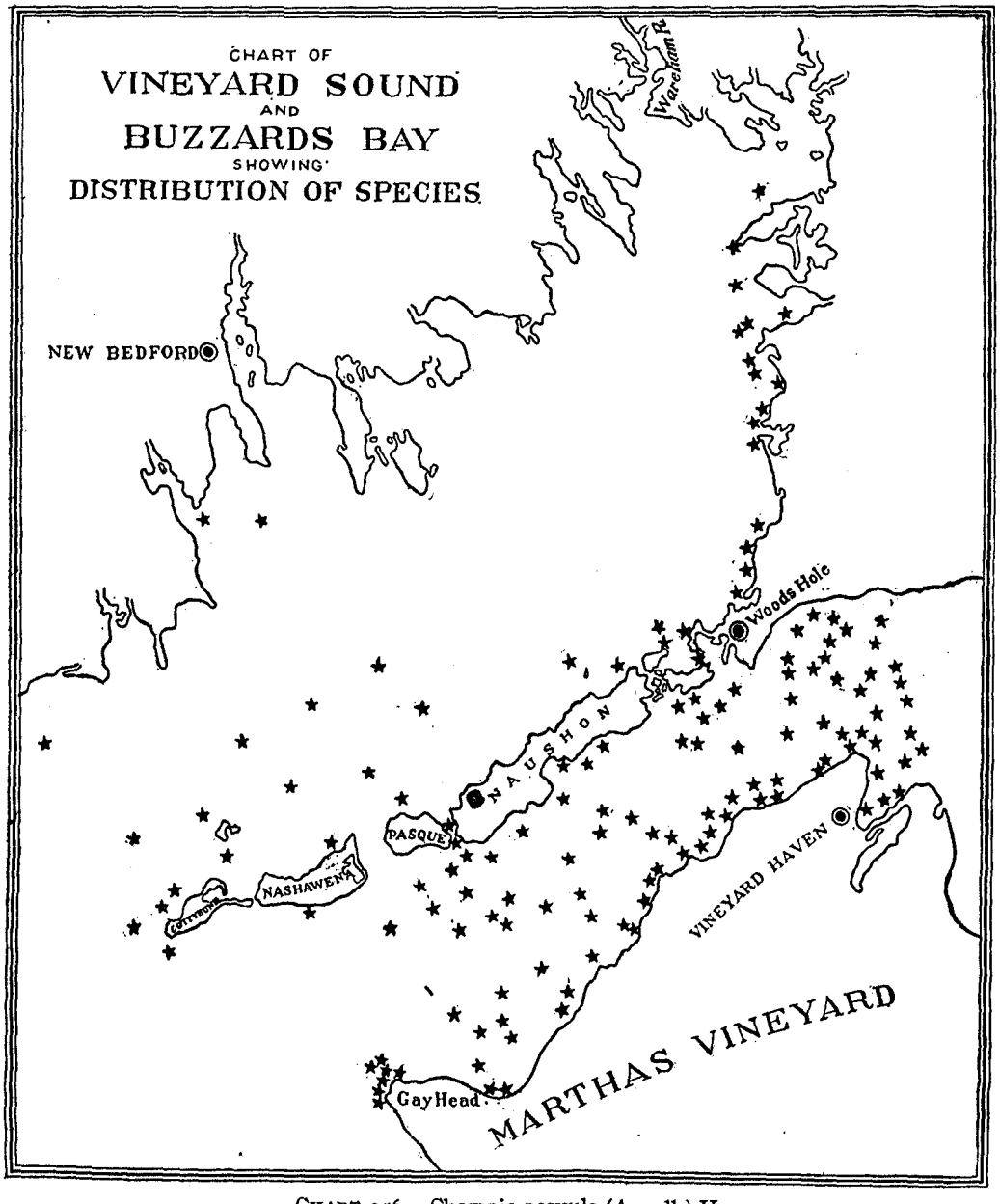

CHART 256.—Champia parvula (Agardh) Harvey.

One of the most widely distributed algæ of the region but preferring warmer and sheltered waters.

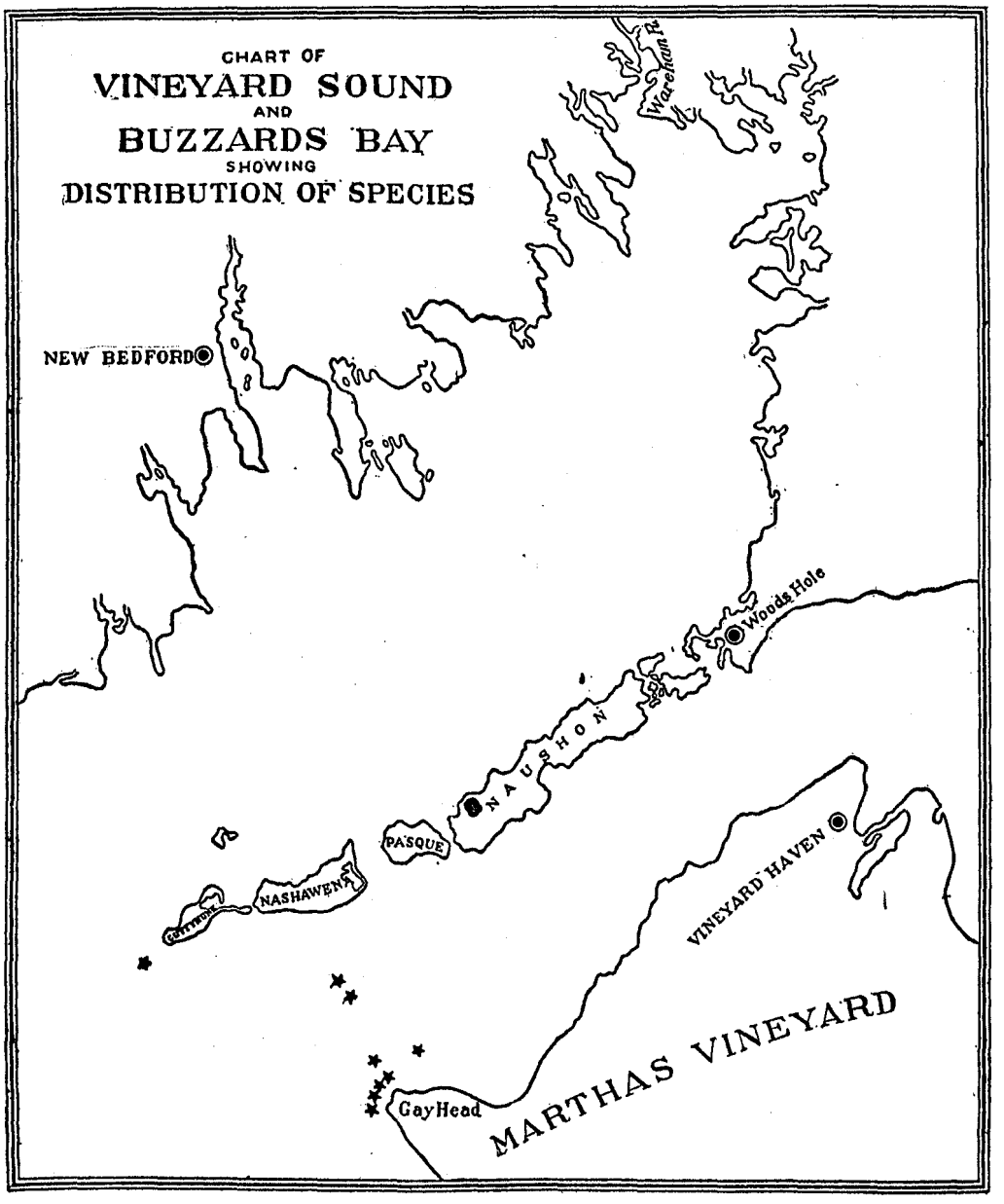

CHART 257.—Lomentaria rosea (Harvey) Thuret.

Restricted to the cooler waters off the exposed points of Gay Head and Cuttyhunk.

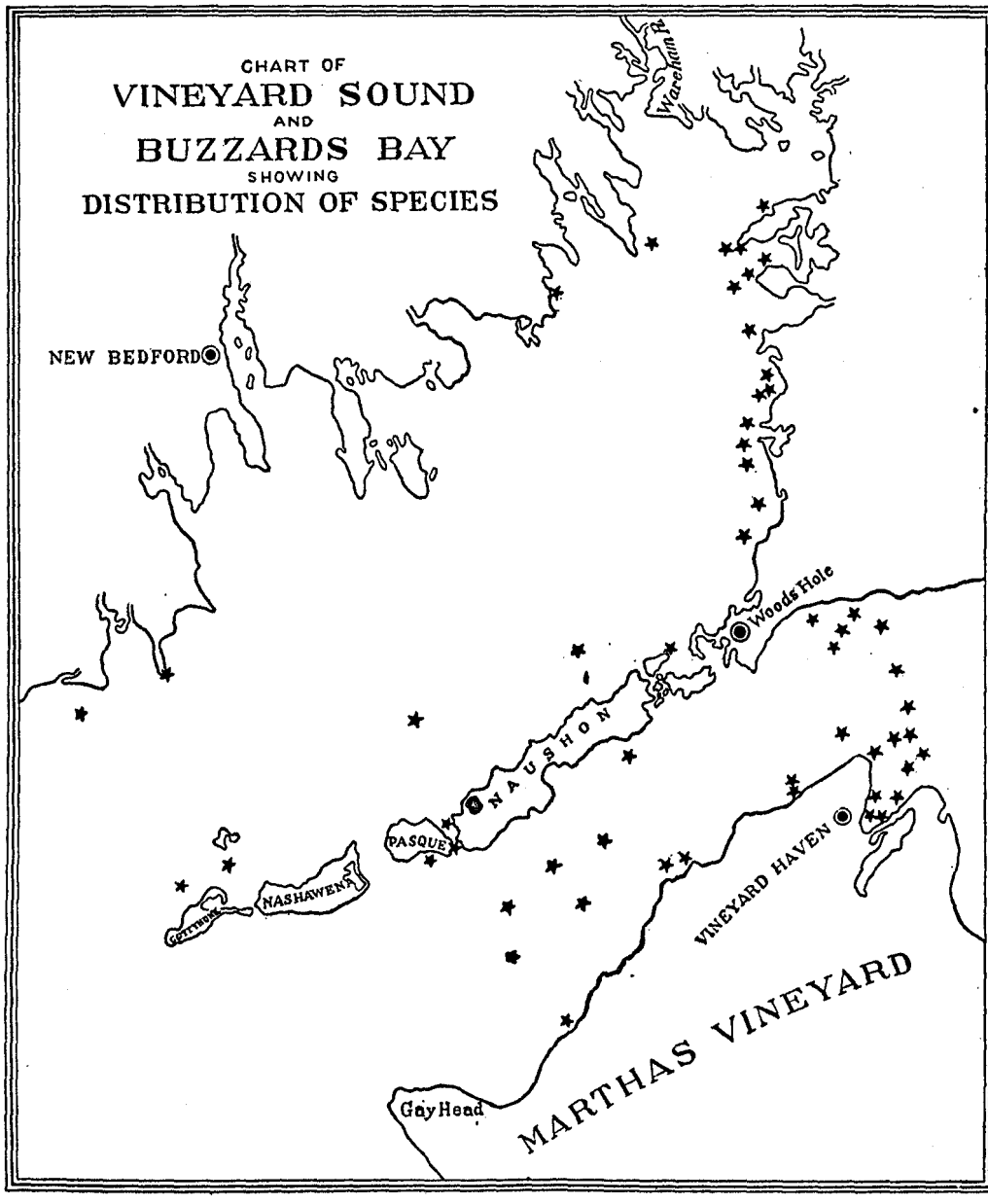

CHART 258.—Lomentaria uncinata Meneghini.

In striking contrast to *Lomentaria rosea* (chart 257) this species is almost restricted to the warmer sheltered waters of Buzzards Bay and Vineyard Sound, where it is widely distributed.

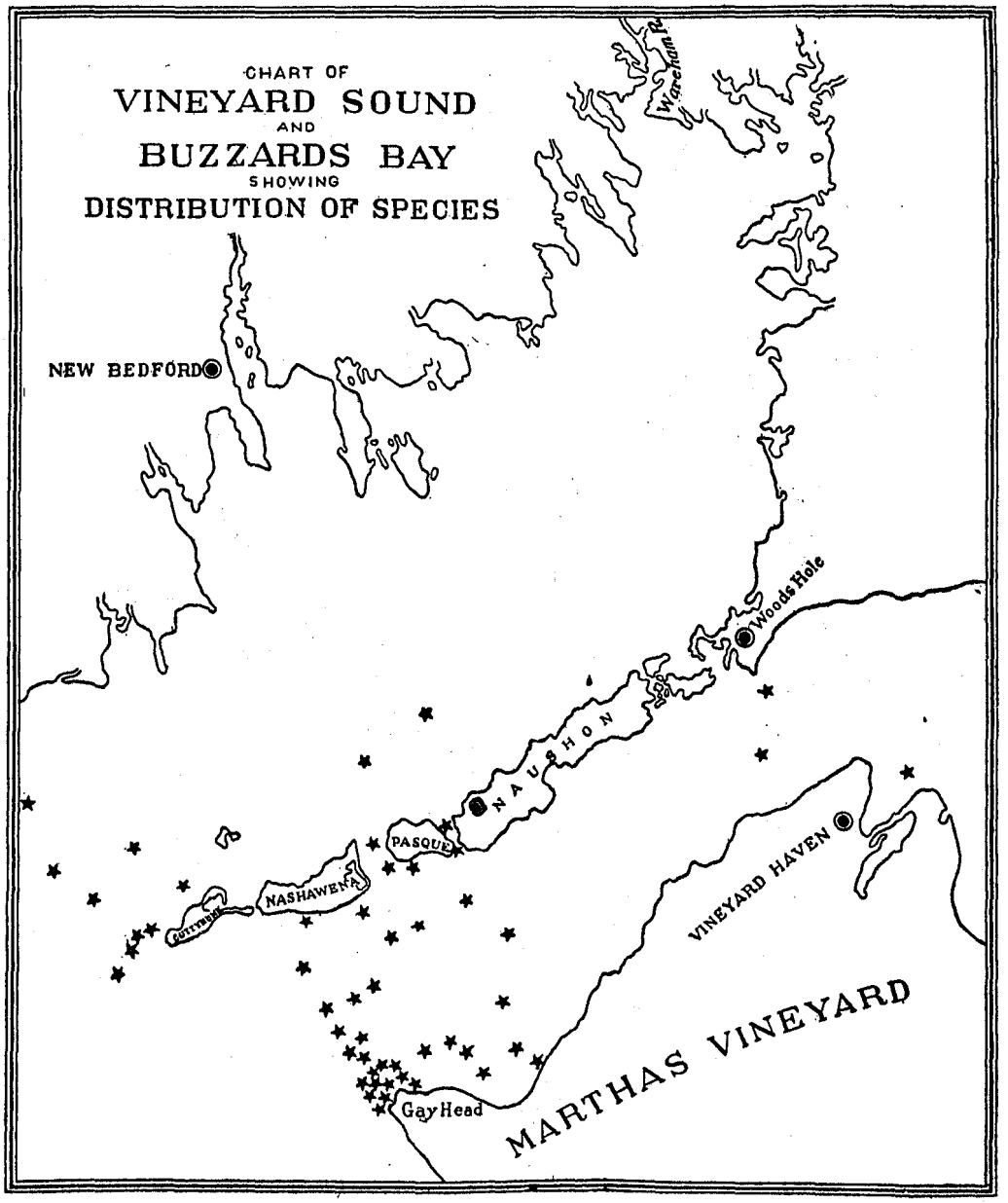

CHART 259.—Rhodymenia palmata (Linnæus) Greville.

A characteristic species of the cooler waters of the lower portion of Buzzards Bay and westerly portion of Vineyard Sound.

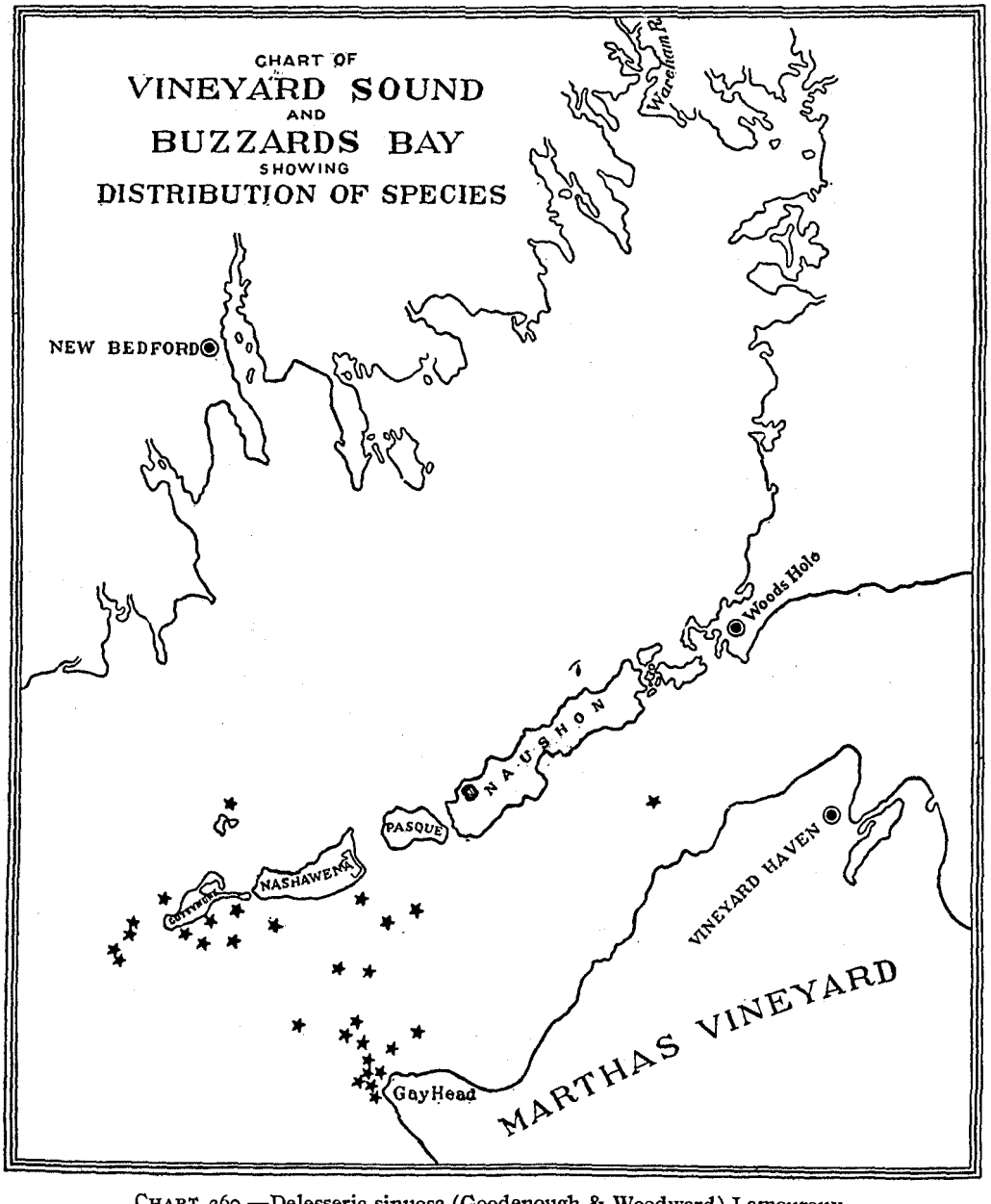

CHART 260.—Delesseria sinuosa (Goodenough & Woodward) Lamouroux.

A striking species practically restricted to the lower portion of Buzzards Bay and westerly portion of Vineyard Sound.

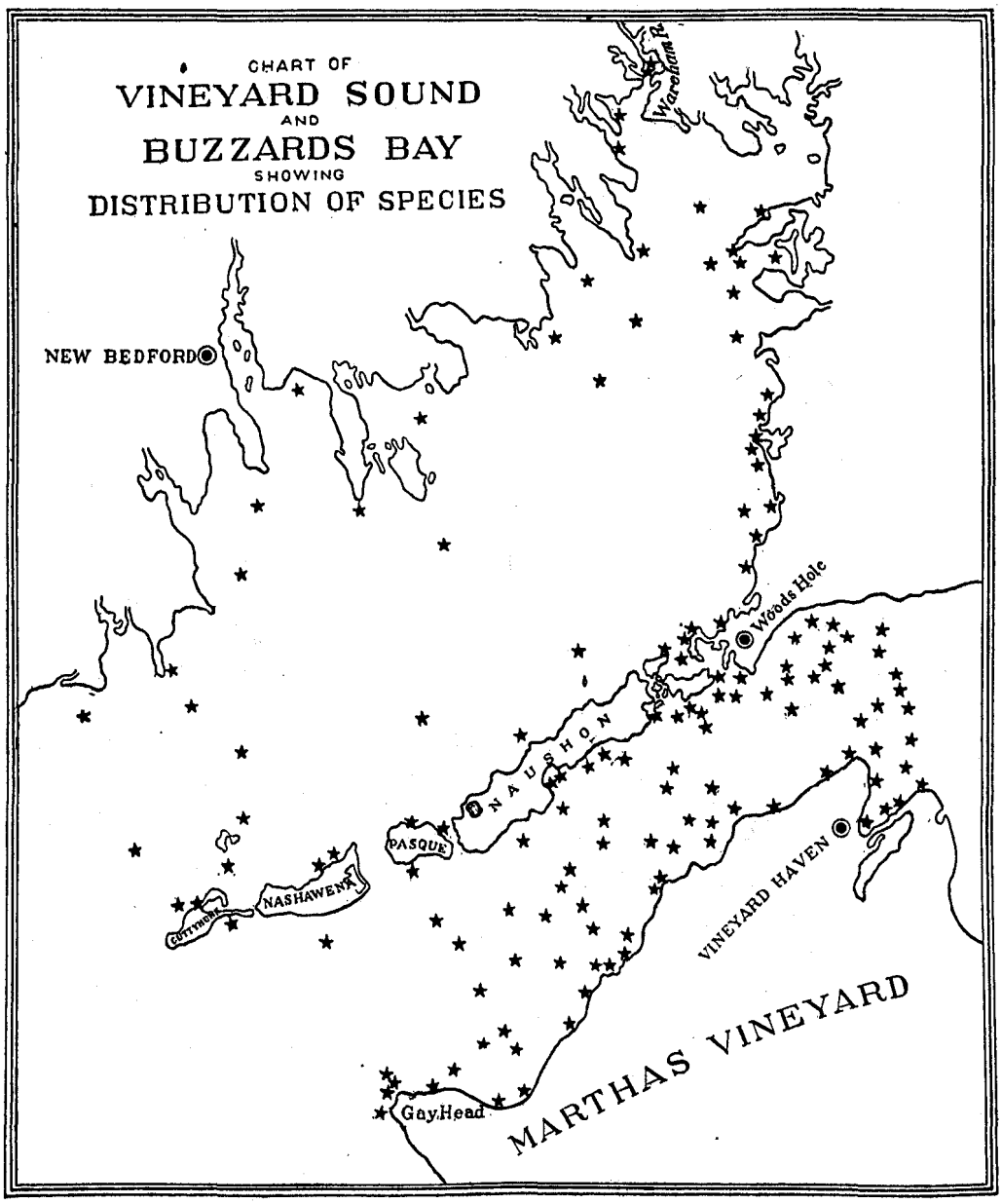

CHART 261.—Grinnellia americana (Agardh) Harvey.

This species is almost universally distributed throughout Buzzards Bay and Vineyard Sound, but prefers the warmer and more sheltered waters.

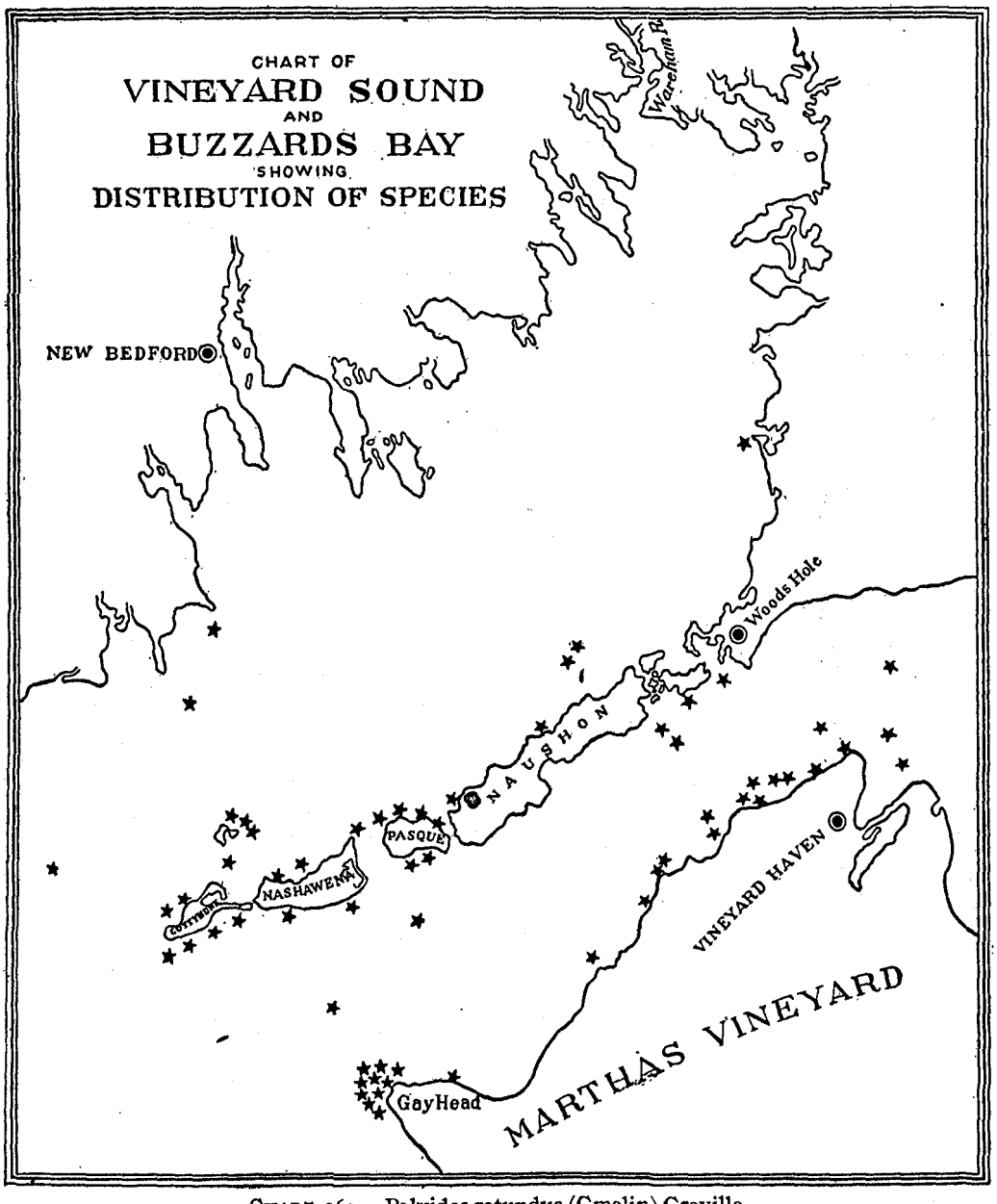

CHART 262.—Polyides rotundus (Gmelin) Greville.

Presents a scattered distribution in Buzzards Bay and Vineyard Sound over sandy, shelly, and stony bottoms.

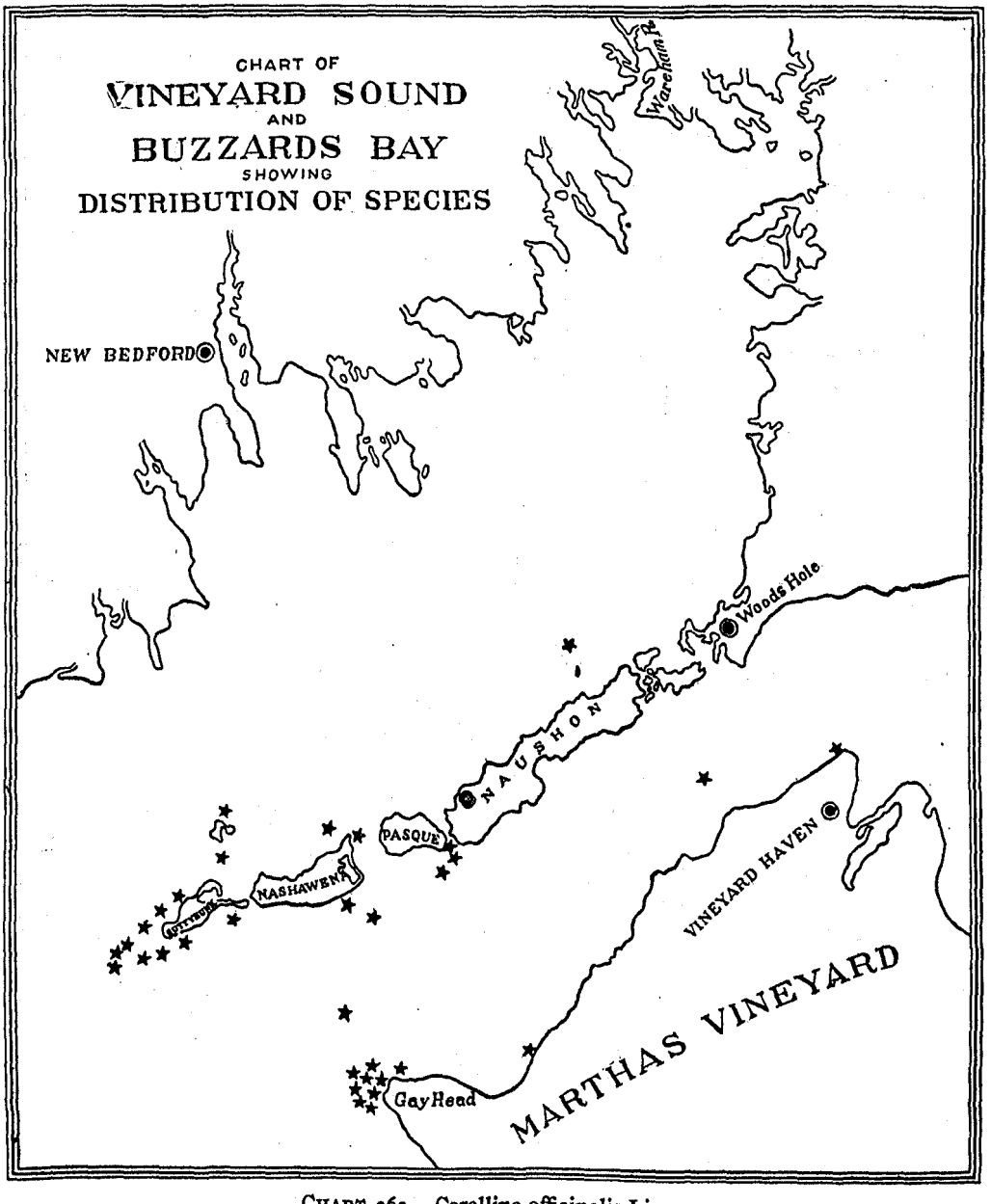

CHART 263.—Corallina officinalis Linnæus.

As dredged by the Survey the species shows a marked preference for the cooler waters off exposed points, as at Gay Head and Cuttyhunk.

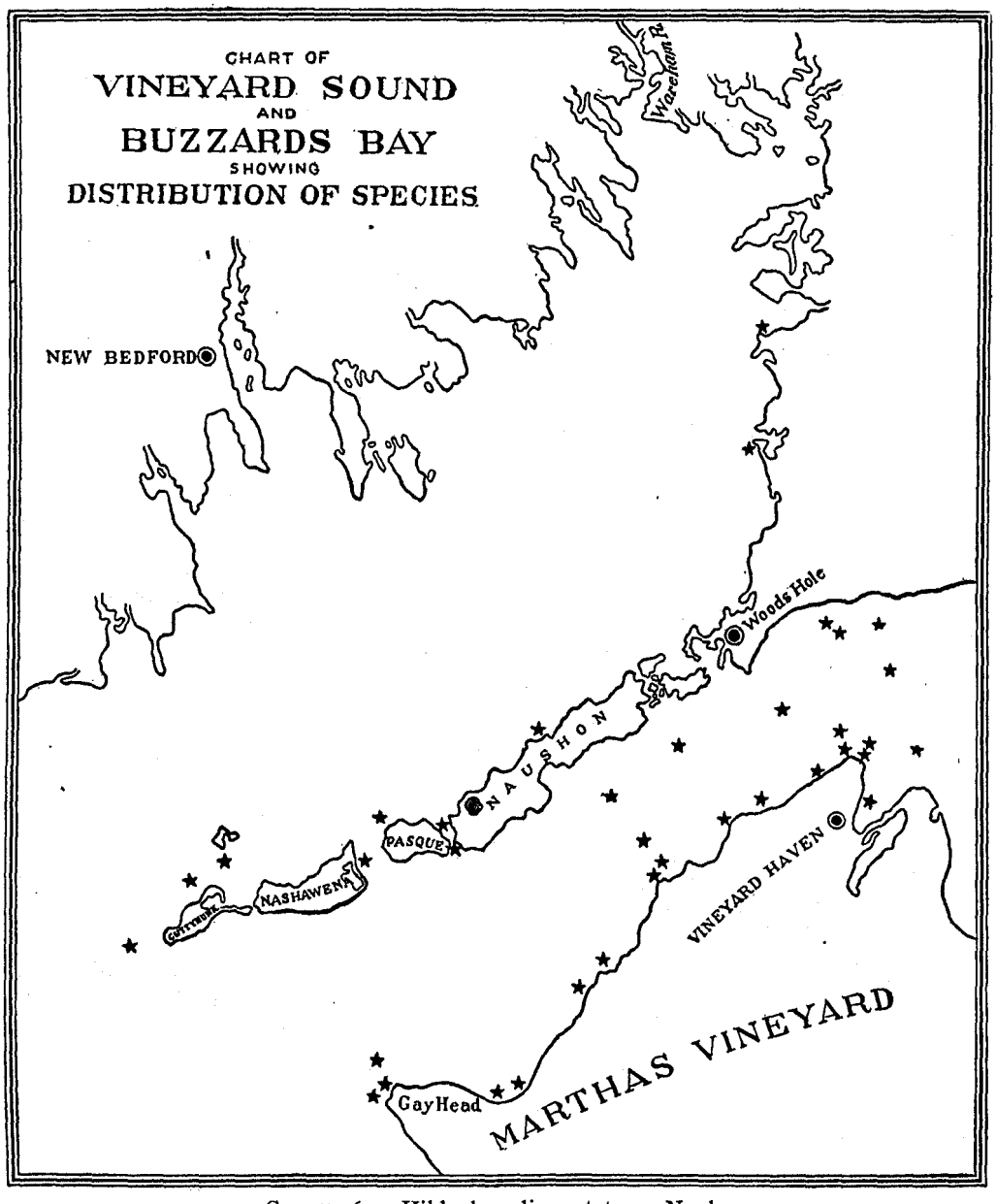

CHART 264.—Hildenbrandia prototypus Nardo.

A scattered distribution in both Buzzards Bay and Vineyard Sound.

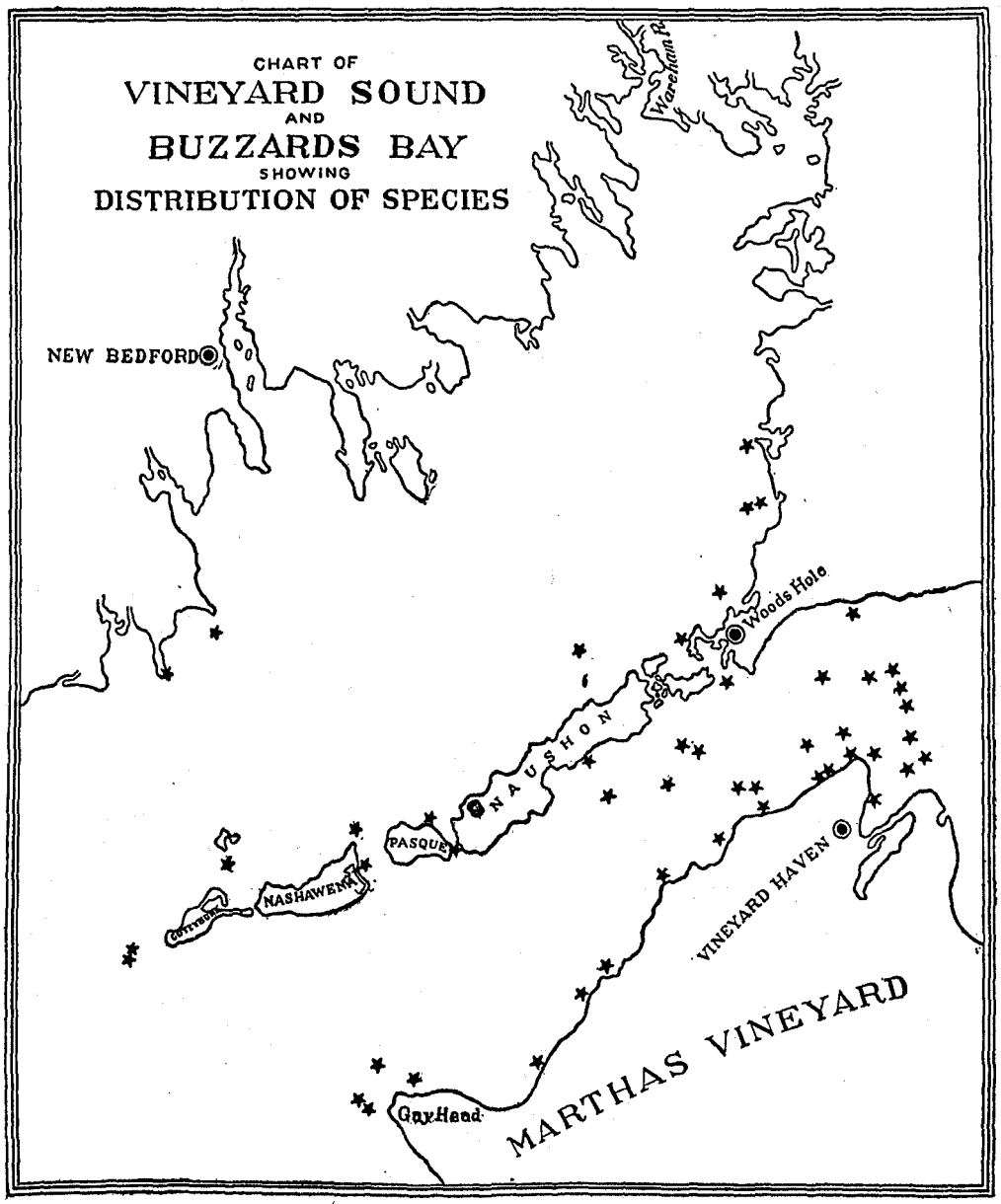

CHART 265.—Lithothamnion polymorphum (Linnæus) Areschoug.

Widely distributed in both Buzzards Bay and Vineyard Sound.

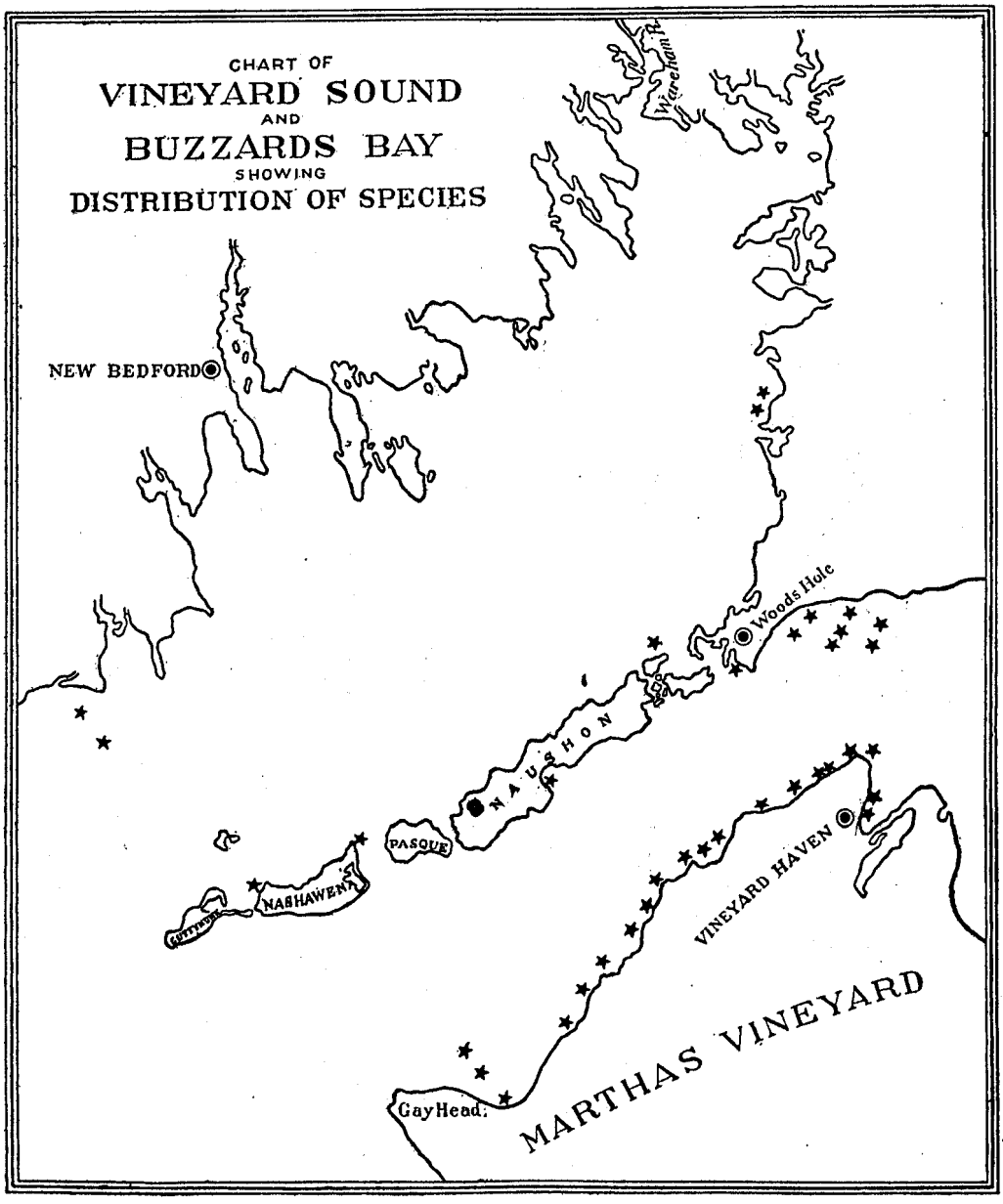

CHART 266.—Zostera marina Linnæus.

This common spermatophyte of the shallow waters presented a scattered distribution, but was unusually abundant off Marthas Vineyard.

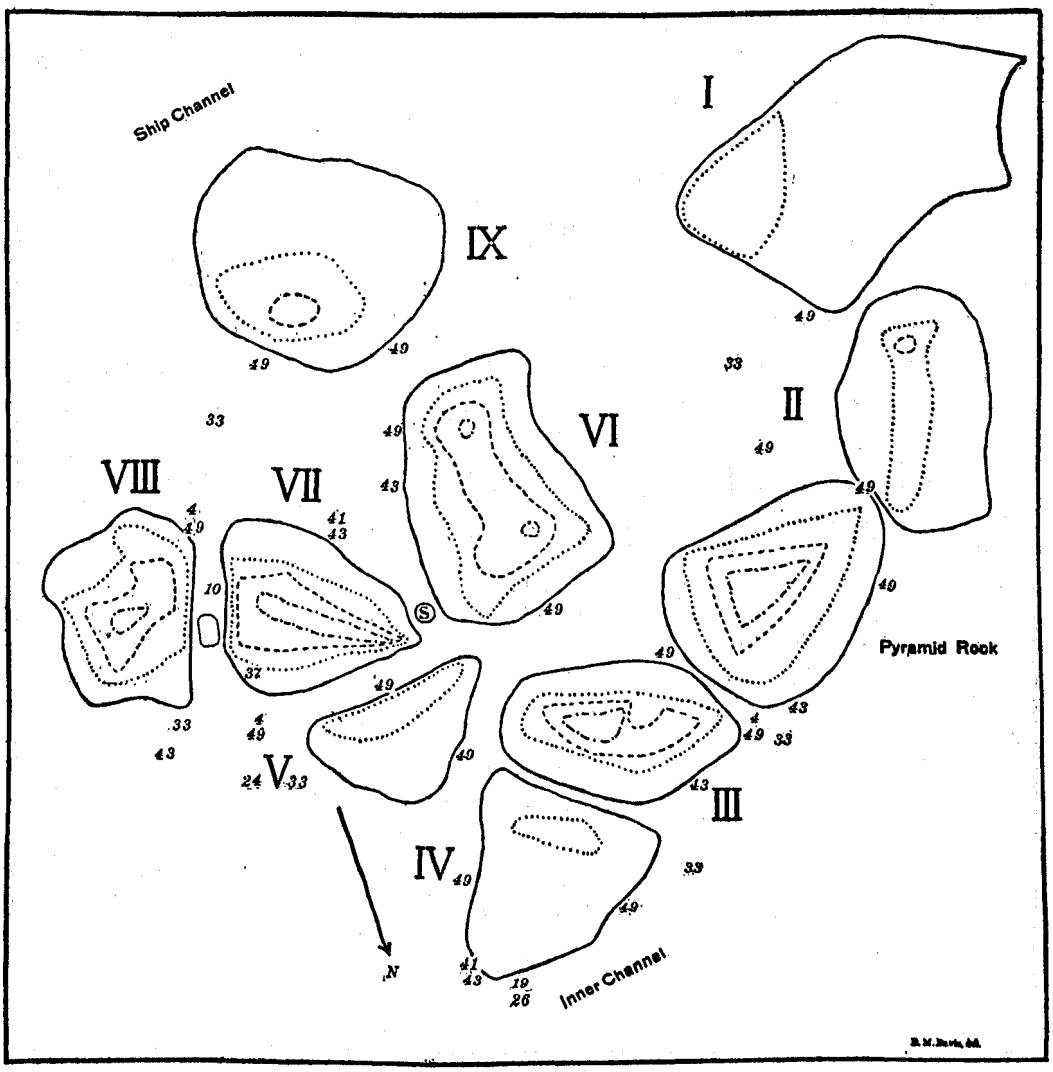

CHART 267.—Distribution of algæ on Spindle Rocks, March 17, 1905.

All the rocks were perfectly bare above low-water mark (the dotted line), having been scraped clean during the winter by floating ice. Algæ were present below low water only in positions where they were protected from contact with the ice. The number of species on the rocks was small in comparison with other seasons of the year, and limited to those that may grow at some depth.

It is interesting to compare the rocks above low-water mark, now entirely bare, with the conditions on December 30, two and one-half months previous (chart 274), for at that date the rocks were covered by growths of *Cladophora lanosa* var. *uncialis* (11), *Phyllitis fascia* (24), and *Scytosiphon lomentarius* (26). The first zone of algæ was well below low water and was composed of *Ceramium rubrum* (43), and *Chondrus crispus* (49), the last extending into deeper water. Somewhat away from the rocks or between them were groups of *Laminaria Agardhii* (33), and occasional growths of *Phyllitis fascia* (24) and *Scytosiphon lomentarius* (26) were present.

List of species: *Ulva Lactuca*, 4, few on *Chondrus; Cladophora lanosa*, 10; *Ectocarpus siliculosus*, 19, on *Scytosiphon; Phyllitis fascia*, 24, few; *Scytosiphon lomentarius*, 26, few; *Laminaria Agardhii*, 33, groups in deep water; *Porphyra laciniata*, 37, occasional; *Callithamnion Baileyi*, 41, on *Ceramium; Ceramium rubrum*, 43, abundant; *Chondrus crispus*, 49, abundant.

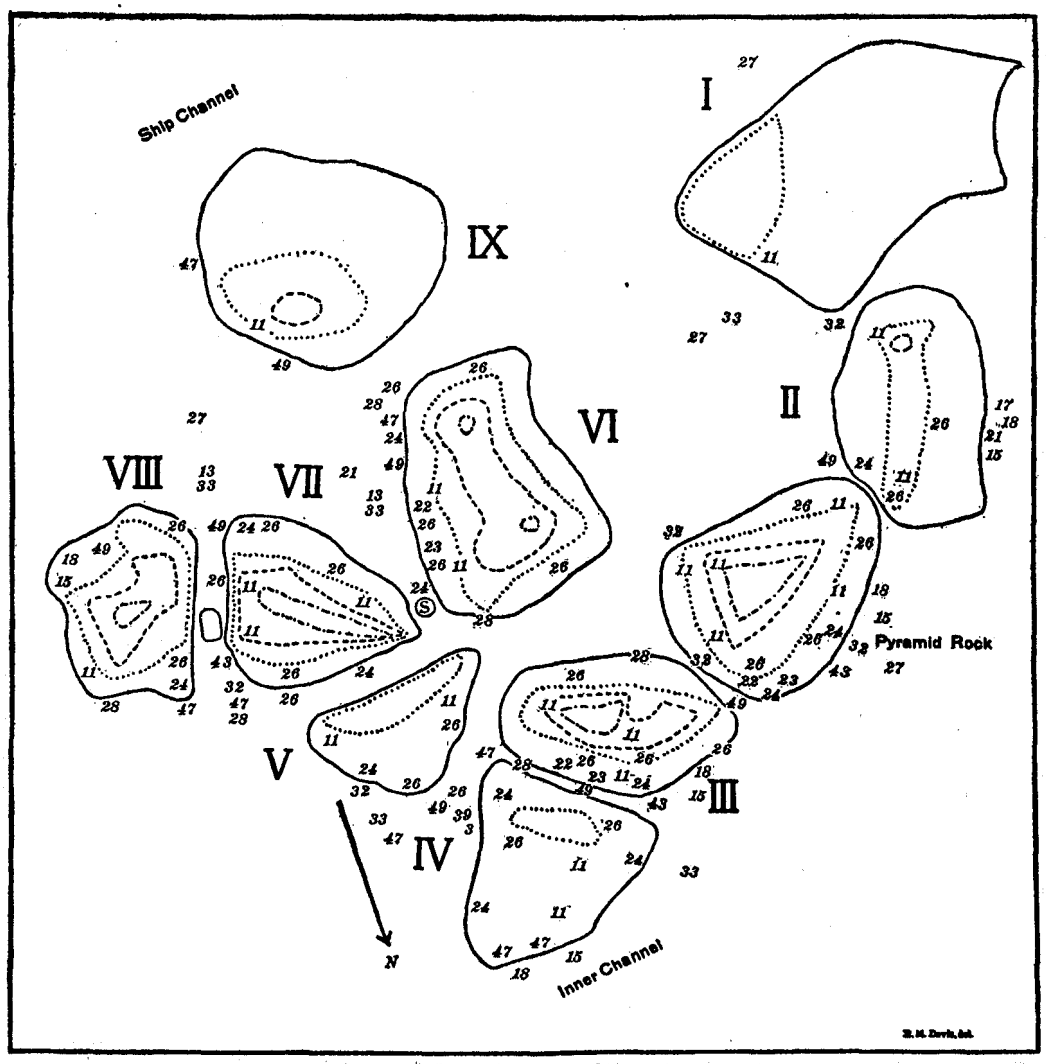

CHART 268.—Distribution of algæ on Spindle Rocks, April 22, 1905.

Rocks still very bare above low-water mark, where they were scraped clean during the winter by floating ice. *Cladophora lanosa* var. *uncialis* (11) formed a green fringe on certain rocks near low-water mark (the dotted line), with the brown algæ *Phyllitis fascia* (24) and *Scytosiphon lomentarius* (26) beginning to appear lower down; this rather imperfect brown zone was composed of young growth and was not very conspicuous at this date. Well below low water were growths of the conspicuous red algæ *Polysiphonia urceolata* (47) and *Chondrus crispus* (49).

List of species: *Cladophora lanosa* var. *uncialis*, 11, very abundant; *Ectocarpus œcidioides*, 13, on old *Laminaria; Ectocarpus fasciculatus*, 15, abundant on larger algæ; *Ectocarpus ovatus*, 17, on mussel shells; *Ectocarpus penicillatus*, 18, very abundant on larger algæ; *Sorocarpus uvæformis*, 21, on mussel shells; *Desmotrichum balticum*, 22, mixed with *Scytosiphon; Desmotrichum undulatum*, 23, mixed with *Scytosiphon; Phyllitis fascia*, 24, young growth on rocks; *Scytosiphon lomentarius*, 26, young growth on rocks; *Desmarestia viridis*, 27, many young plants; *Chordaria flagelliformis*, 28, young plants; *Chorda tomentosa*, 32; *Laminaria Agardhii*, 33; *Acrochætium virgatulum*, 39, on *Ceramium; Ceramium rubrum*, 43; *Polysiphonia urceolata*, 47, abundant; *Chondrus crispus*, 49, abundant.

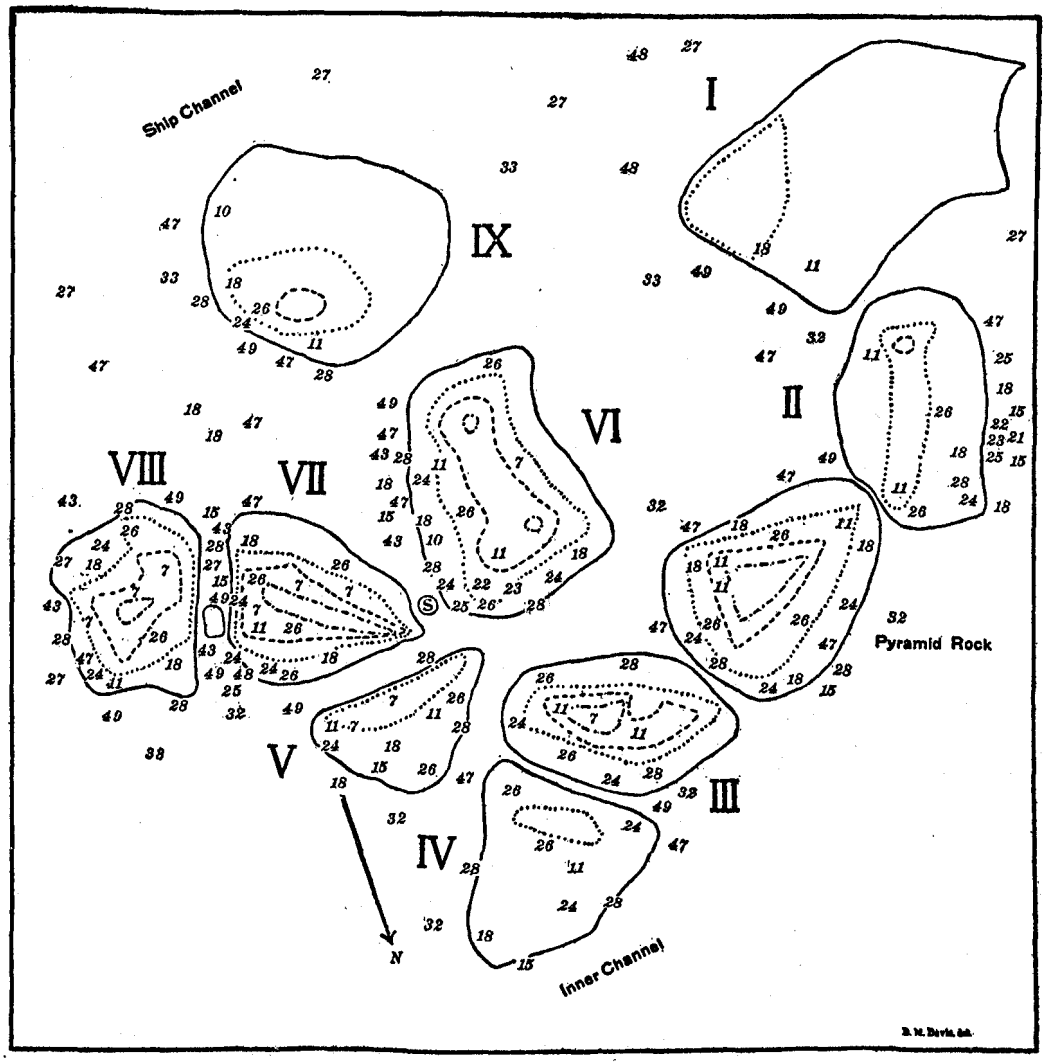

CHART 269.—Distribution of algæ on Spindle Rocks, May 22, 1905.

The rocks at this date presented a characteristic algal flora of the spring at its full development. There was not much change in the species since April 22 (chart 268), but a large increase in the quantity of vegetation. *Cladophora lanosa* var. *uncialis* (11) was still the dominant green alga, but *Enteromorpha intestinalis* (7) had begun to appear; these two species extended the green zone much higher up on the rocks than where it was a month previous (chart 268). The brown zone at low-water mark (the dotted line) and just below, composed chiefly of *Ectocarpus penicillatus* (18), *Phyllitis fascia* (24), *Scytosiphon lomentarius* (26), and *Chordaria flagelliformis* (28), was also broader and more evident. *Polysiphonia urceolata* (47) formed a conspicuous red zone below the brown, with extensive growths of *Chondrus crispus* (49) extending into deeper water.

List of species: *Enteromorpha intestinalis*, 7, young plants; *Cladophora lanosa* var. *uncialis*, 11, abundant; *Ectocarpus fasciculatus*, 15, abundant on larger algæ; *Ectocarpus penicillatus*, 18, abundant on larger algæ; *Sorocarpus uvæformis*, 21, few on mussel shells; *Desmotrichum balticum*, 22, few mixed with *Scytosiphon; Desmotrichum undulatum*, 23, few mixed with *Scytosiphon; Phyllitis fascia*, 24, very abundant; *Punctaria plantaginea*, 25, few; *Scytosiphon lomentarius*, 26, abundant; *Desmarestia viridis*, 27, very abundant; *Chordaria flagelliformis*, 28, much; *Chorda tomentosa*, 32, abundant; *Laminaria Agardhii*, 33; *Ceramium rubrum*, 43, abundant; *Polysiphonia urceolata*, 47, abundant; *Polysiphonia violacea*, 48, few; *Chondrus crispus*, 49, abundant.

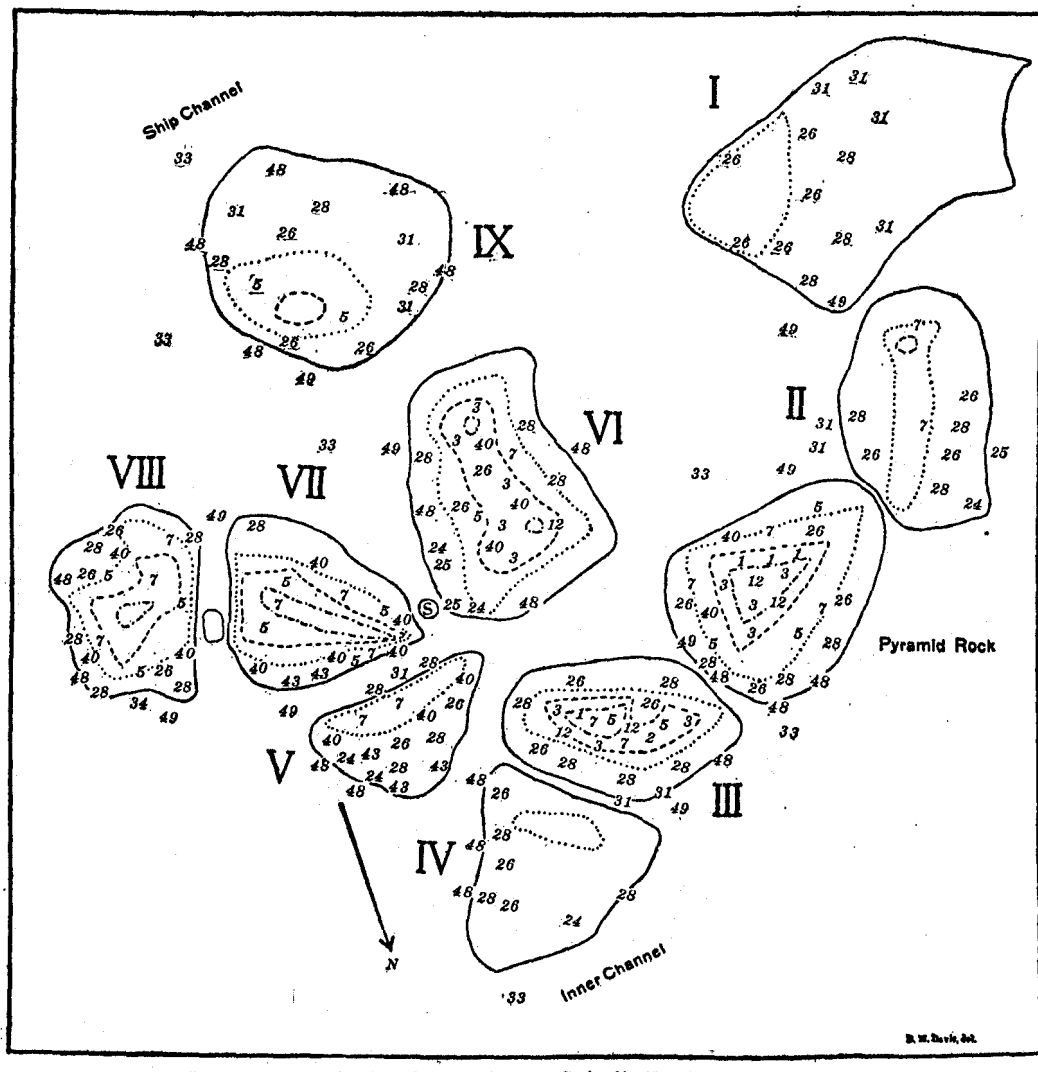

CHART 270.—Distribution of algæ on Spindle Rocks, June 29, 1905.

The character of the vegetation on the rocks had greatly changed from that of May 22 (chart 269), and marked the beginning of the characteristic summer flora and the end of the spring season. A green zone on the upper parts of the rocks was composed chiefly of *Ulothrix implexa* (3), *Ulva Lactuca* var. *rigida* (5), and *Enteromorpha intestinalis* (7); *Cladophora lanosa* var. *uncialis*, formerly so abundant and conspicuous, had entirely disappeared. The brown zone near low-water mark (the dotted line) was composed almost entirely of *Scytosiphon lomentarius* (26), and *Chordaria flagelliformis* (28); *Phyllitis fascia* (24) was only represented by a few old plants, and *Ectocarpus penicillatus* had disappeared. *Polysiphonia urceolata*, so plentiful throughout the spring, was no longer present, but *Polysiphonia violacea* (48) was abundant and with *Ceramium rubrum* (43) formed a fringe around the rocks a little below low-water mark with *Chondrus crispus* (49) in deeper water. *Nemalion multifidum* (40) had begun to appear at and above low-water mark.

List of algæ: *Calothrix scopulorum*, 1, in small patches; *Ulothrix implexa*, 3, covering the top of III, VI, and Pyramid Rock; *Ulva Lactuca* var. *rigida*, 5, abundant young growths; *Enteromorpha intestinalis*, 7, much; *Codiolum gregarium*, 10, abundant on barnacles; *Phyllitis fascia*, 24, few old plants; *Punctaria plantaginea*, 25, few; *Scytosiphon lomentarius*, 26, abundant; *Chordaria flagelliformis*, 28, very abundant; *Chorda filum*, 31; *Laminaria Agardhii*, 33, scattered plants; *Laminaria Agardhii* var. *vittata*, 34, small group; *Nemalion multifidum*, 40, young growth; *Ceramium rubrum*, 43, few; *Polysiphonia violacea*, 48, abundant; *Chondrus crispus*, 49, abundant.

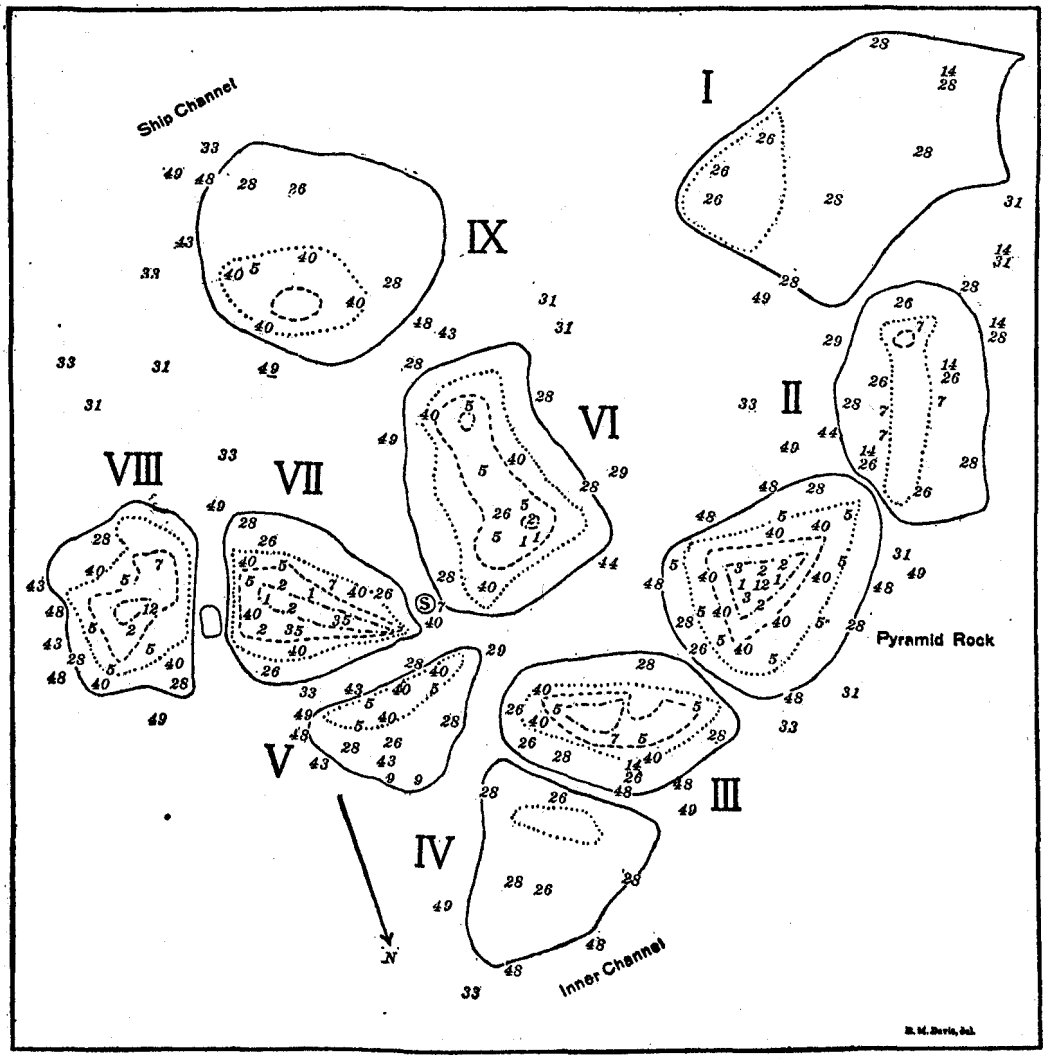

CHART 271.—Distribution of algæ on Spindle Rocks, July 22, 1905.

The only conspicuous green alga was *Ulva Lactuca* var. *rigida* (5), now full grown and forming large patches on some of the rocks. There was a very well-defined brown zone just below low-water mark (the dotted line) composed of *Chordaria flagelliformis* (28) and old *Scytosiphon lomentarius* (26). *Ectocarpus confervoides* (14) was plentiful on the *Chordaria* and *Scytosiphon*. *Phyllitis fascia* had disappeared. *Nemalion multifidum* (40) fringed most of the rocks at low-water mark, and below was a characteristic red zone of *Polysiphonia violacea* (48) and *Ceramium rubrum* (43) mixed with the *Chordaria*, and with *Chondrus crispus* (49) abundant from 1–5 feet below low water.

List of algæ: *Calothrix scopulorum*, 1, small patches on barnacles and rocks; *Rivularia atra*, 2, on barnacles; *Ulothrix implexa*, 3, on Pyramid Rock; *Ulva Lactuca* var. *rigida*, 5, abundant on tops of rocks; *Enteromorpha intestinalis*, 7, few patches; *Cladophora gracilis*, 9, few tufts; *Codiolum gregarium*, 12, on barnacles; *Ectocarpus confervoides*, 14, abundant on *Chordaria* and *Scytosiphon*; *Scytosiphon lomentarius*, 26, much old growth; *Chordaria flagelliformis*, 28, abundant; *Mesogloia divaricata*, 29, few patches; *Chorda filum*, 31, large patches; *Laminaria Agardhii*, 33, few groups; *Fucus vesiculosus*, 35, few plants; *Nemalion multifidum*, 40, abundant; *Ceramium rubrum*, 43, abundant; *Chondria dasyphylla*, 44, few plants; *Polysiphonia violacea*, 48, abundant; *Chondrus crispus*, 49, abundant.

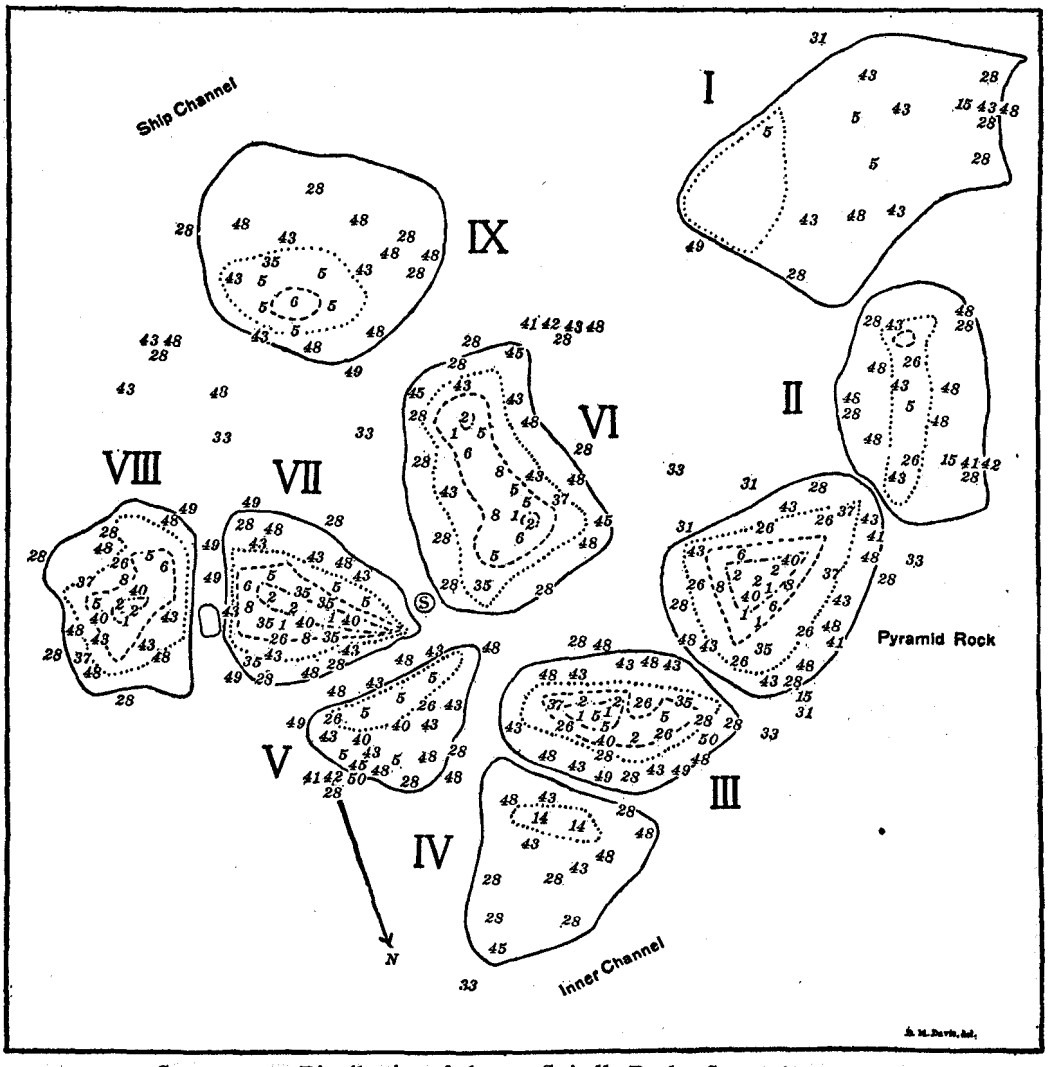

CHART 272.—Distribution of algæ on Spindle Rocks, September 2, 1905.

The rocks on September 2 presented an aspect similar to that on July 22 (chart 271) with some features, however, more pronounced. The prevailing green alga was *Ulva Lactuca* var. *rigida* (5) forming large patches on the tops of rocks. The most conspicuous brown algæ were *Chordaria flagelliformis* (28), growing in large masses, sometimes as a zone below low-water mark (the dotted line), and old *Scytosiphon lomentarius* (26) forming patches higher up on the rocks. The most conspicuous zone (much more pronounced than in chart 271) was that near low-water mark composed of *Ceramium rubrum* (43) and *Polysiphonia violacea* (48). There was much less *Nemalion multifidum* (40), which, however, formed a zone on rocks V, VII, and VIII. *Chondrus crispus* (49) was plentiful in deeper water below the *Chordaria*.

List of algæ: *Calothrix scopulorum*, 1, small patches on barnacles and rocks; *Rivularia atra*, 2, on barnacles; *Ulva Lactuca* var. *rigida*, 5, plentiful on tops of rocks; *Enteromorpha crinita*, 6, few plants; *Enteromorpha prolifera*, 8, few plants; *Ectocarpus confervoides*, 14, on old plants of *Scytosiphon; Ectocarpus fasciculatus*, 15, abundant on *Chordaria* and *Chorda; Scytosiphon lomentarius*, 26, patches of old plants; *Chordaria flagelliformis*, 28, abundant; *Chorda filum*, 31, large patches; *Laminaria Agardhii*, 33, occasional plants; *Fucus vesiculosus*, 35, scattered plants; *Porphyra laciniata*, 37, scattered plants; *Nemalion multifidum*, 40, abundant; *Callithamnion Baileyi*, 41, many on *Chordaria; Callithamnion corymbosum*, 42, many on *Chordaria; Ceramium rubrum*, 43, very abundant; *Dasya elegans*, 45, occasional plants; *Polysiphonia violacea*, 48, very abundant; *Chondrus crispus*, 49, abundant; *Champia parvula*, 50, occasional on *Chordaria* and rocks.

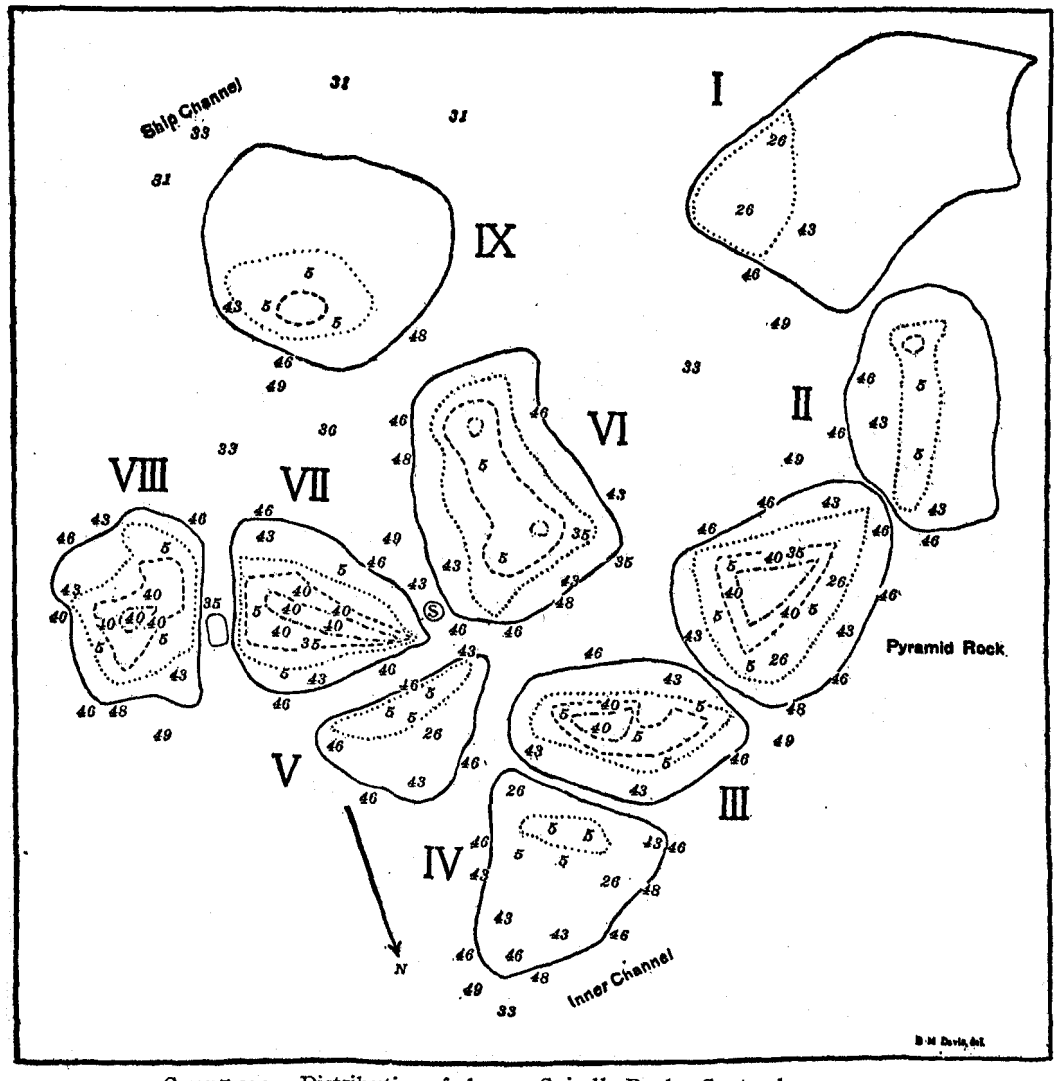

CHART 273.—Distribution of algæ on Spindle Rocks, September 19, 1904.

This chart is introduced to show variations that may be present in the algal life on the same rocks at the same season but in different years. It should be compared with chart 272, plotted September 2, 1905. The charts agree in having *Ulva Lactuca* var. *rigida* (5) as the conspicuous green alga on the tops of the rocks. There was no *Chordaria flagelliformis* this season and consequently no zone of brown algæ, although *Scytosiphon lomentarius* (26) grew in scattered patches. *Nemalion multifidum* (40) formed a zone of thick growth above low-water mark (the dotted line) on rocks III, VII, VIII, and Pyramid Rock. The most conspicuous zone was below low water and composed of *Ceramium rubrum* (43) and *Polysiphonia fibrillosa* (46). The *Polysiphonia fibrillosa*, which was not present at all in 1905, this season took the place of *Chordaria flagelliformis* and *Polysiphonia violacea* (48), usually abundant, but scattered plants of the latter were present. *Chondrus crispus*, as usual, was abundant, extending into deeper water below the *Polysiphonia*.

List of species: *Ulva Lactuca* var. *rigida*, 5, abundant; *Scytosiphon lomentarius*, 26, patches on rocks; *Chorda filum*, 31, large beds; *Laminaria Agardhii*, 33, scattered patches; *Fucus vesiculosus*, 35, scattered plants, *Sargassum Filipendula*, 36, few plants; *Nemalion multifidum*, 40, abundant; *Ceramium rubrum*, 43, abundant; *Polysiphonia fibrillosa*, 46, very abundant, fringing rocks just below low-water; *Polysiphonia violacea*, 48, few; *Chondrus crispus*, 49, abundant.

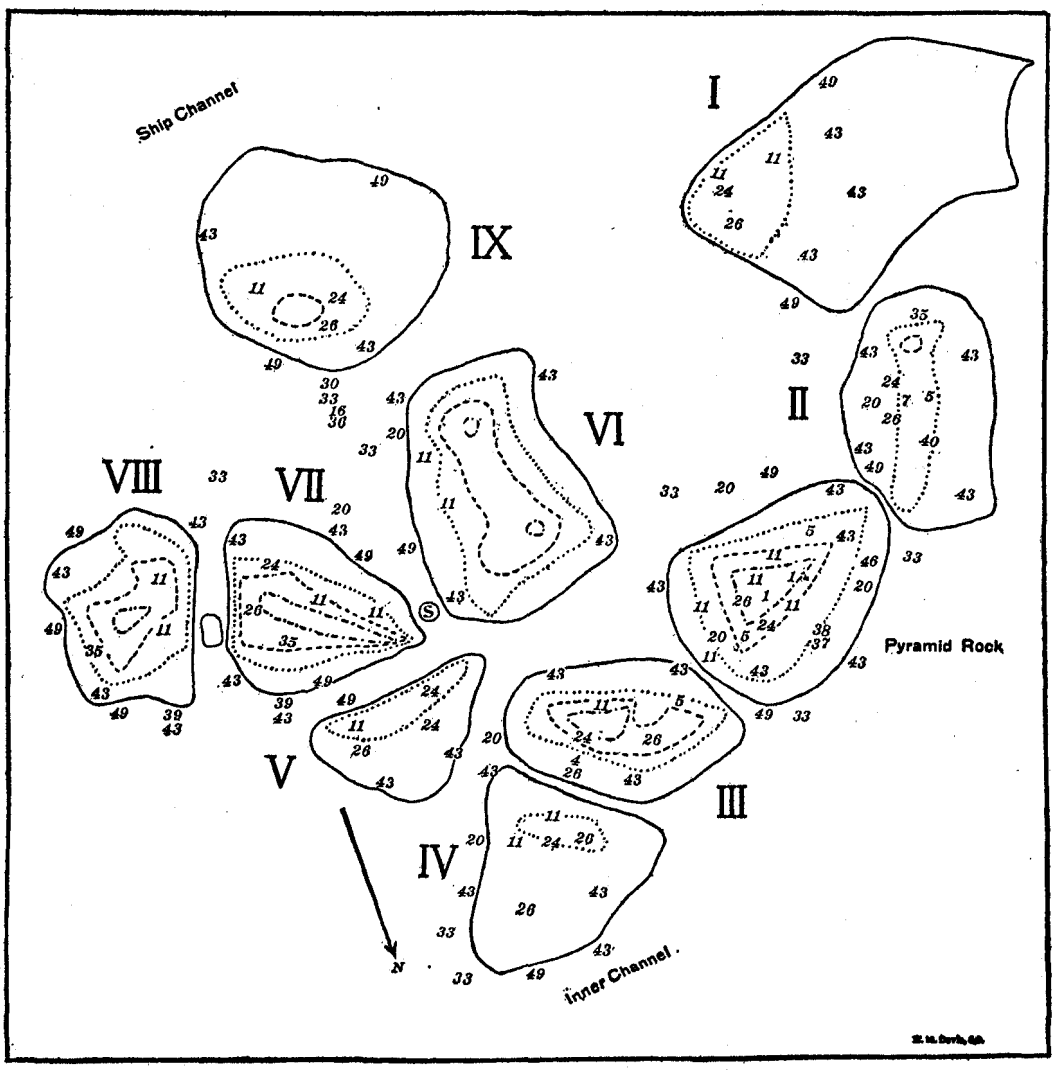

CHART 274.—Distribution of algæ on Spindle Rocks, December 30, 1904.

This chart plots the vegetation on the rocks in the winter before the upper parts are scraped clean by floating ice. In the series of charts it shows the conditions two and one-half months before those presented on chart 267. The prevailing green alga was *Cladophora lanosa* var. *uncialis* (11), present on the upper portions of every rock above low-water mark (the dotted lines). Near low-water mark was a brown zone of *Phyllitis fascia* (24) and *Scytosiphon lomentarius* (26). *Phyllitis fascia*, which disappears in the summer, had returned in abundance. Below low water was a red zone of *Ceramium rubrum* (43), very plentiful, and in deeper water was the ever-present *Chondrus crispus* (49). *Polysiphonia fibrillosa* (46), so abundant September 19 (chart 273), had almost disappeared, and there was no *Polysiphonia violacea*, generally characteristic of the summer. Only a few plants of *Nemalion multifidum* (40) remained.

List of algæ: *Calothrix scopulorum*, 1, patches on the top of Pyramid Rock; *Ulva Lactuca* var. *rigida*, 5, bases of old plants; *Enteromorpha intestinalis*, 7, few scattered plants; *Cladophora lanosa* var. *uncialis*, 11, abundant on the top of every rock; *Ectocarpus granulosus*, 16, abundant on *Sargassum* and other large algæ below low-water; *Ectocarpus tomentosus*, 20, abundant on larger algæ below low-water; *Phyllitis fascia*, 24, abundant above low-water; *Scytosiphon lomentarius*, 26, very abundant above low-water; *Myrionema corunnæ*, 30, on *Laminaria; Laminaria Agardhii*, 33, many old plants; *Fucus vesiculosus*, 35, few scattered plants; *Sargassum Filipendula*, 36, few young plants; *Porphyra laciniata*, 37, scattered plants; *Acrochætium secundatum*, 38, on *Porphyra; Acrochætium virgatulum*, 39, on *Ceramium; Nemalion multifidum*, 40, few plants; *Ceramium rubrum*, 43, very abundant; *Polysiphonia fibrillosa*, 46, few plants; *Chondrus crispus*, 49, abundant.